AVIATION WEEK
JULY 21, 1952
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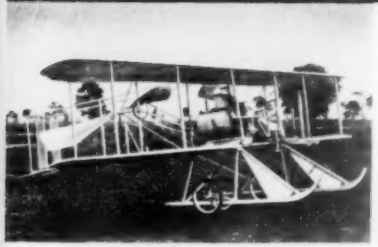

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SINCE the Navy began flying wheeled aircraft in 1911 with the Wright Brothers B-1, they've always been sticklers for dependability — just as they are today with the "Skyshark," first Turbo-Prop shipboard fighter to join the fleet. And ever since Goodyear built the first Wing Airplane tire for the early Wright ships, dependability has been the watchword here, too.

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For specific information and cooperation in both the civilian and military fields, consult our Engineering Division.

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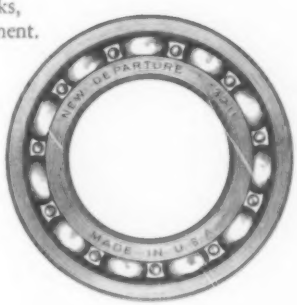

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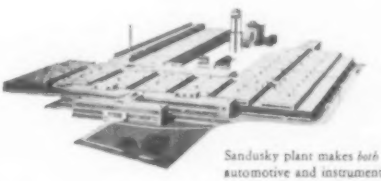

Sandusky plant makes *both* automotive and instrument bearings.

Nothing Rolls Like a Ball...

NEW DEPARTURE

BALL BEARINGS

165

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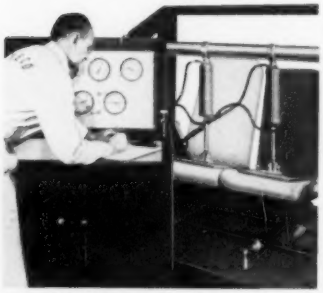
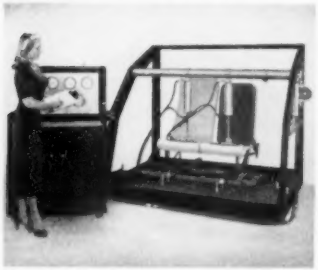
gets the answers to better airline seat designs!



Constant airline seat development work at TECO includes rigid strength and load testing programs for every seat design on a custom-built hydraulic test rig. Intelligent interpretation of test data influences structural changes, when necessary, to positively provide every TECO seat customer with the most safe, rugged, light weight and maintenance-free airline seat available . . . another reason leading airlines agree—the finest airline seats are TECO-built!



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Aviation Week

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Volume 57 **July, 21, 1952** **Number 3**

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Jet engine oil cooler ----→

WITH REMOVABLE CORE!

Another AiResearch First!
Pioneer in creating aircraft heat transfer equipment—AiResearch builds the *only oil coolers which can be serviced in the field!*

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Since the core can be removed and easily cleaned by a flushing process, the oil system is kept free of metal chips and sludge, thus avoiding severe damage to valuable engines. This saving of time and equipment aids the Armed Services in delivering "more air power for the dollar."

This new-type oil cooler can withstand 1300 lbs. fuel pressure, a very high rating.

Today AiResearch manufactures 66 different types of heat exchangers to equip nearly every high speed, high altitude airplane of United States design. They include fuel-oil coolers, air-oil coolers, air-to-air heat exchangers and special equipment for cabin heating, cooling and moisture control.

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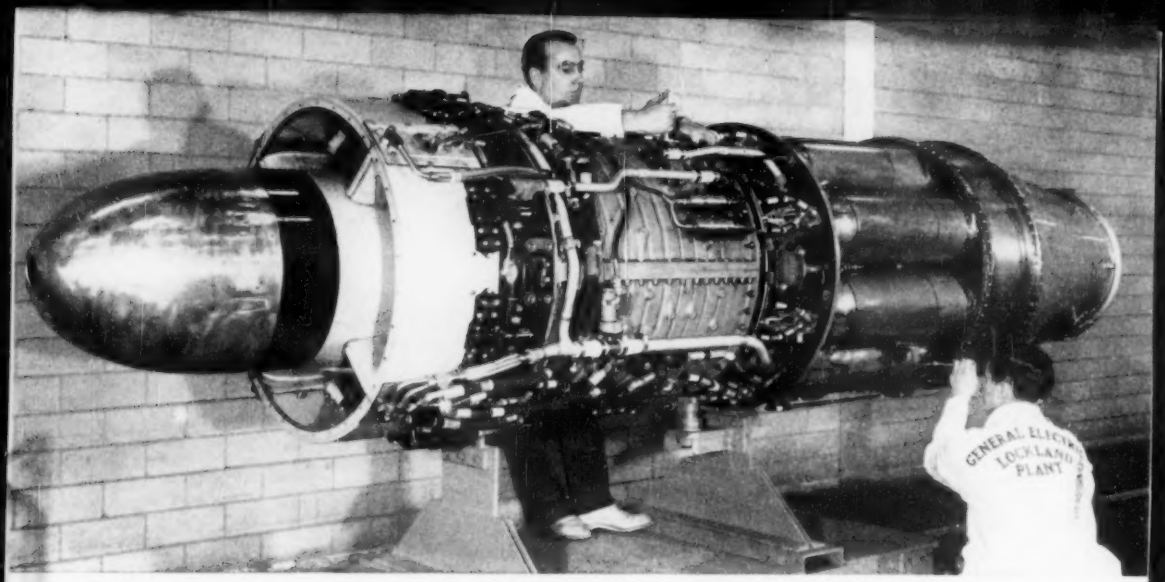


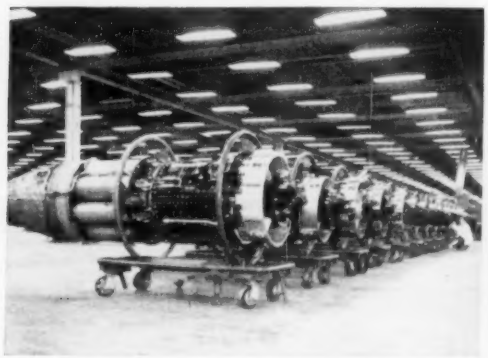
THE J47-GE-27, newest production model in G.E.'s "all-weather" J47 series, will power the North American F-86F Sabre. A modified -27 will power the Navy's FJ-2 Fury, carrier version of the F-86. Sister engines, the -23 and -25, are powerplants for the Boeing B-47B Stratojet.

NEWEST "ALL-WEATHER" ENGINE IN PRODUCTION

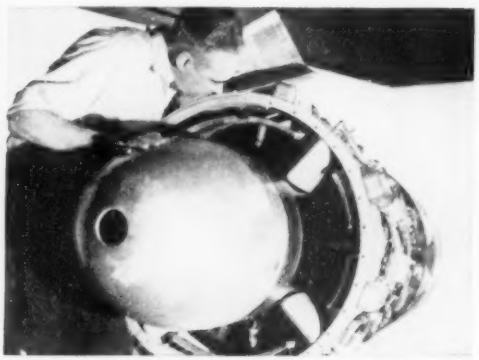
J47-27 Has 10% Greater Thrust Than Present F-86 Engine, Lower Fuel Consumption Without Size or Weight Increase

By incorporating a more efficient compressor, heated inlet surfaces and retractable air screens, the new high-performance J47-27 is capable of operation under extreme conditions of weather. An improved combustion system with high-voltage, opposite polarity ignition and larger crossover flame propagation tubes allows automatic starts to above 40,000 feet.

Constant product improvement is standard practice at General Electric with all aviation equipment. The benefits of this policy can be yours by calling on your G-E Aviation Specialist or writing the *General Electric Company, Schenectady 5, N. Y.*



NOW IN PRODUCTION at Lynn, Mass., and soon to roll off the line in quantity at the Lockland, Ohio plant, the J47-27 is the third in G.E.'s series of all-weather engines. In addition, two major automobile manufacturers will start producing the -27 this year under license.



"HOT NOSE" PREVENTS ICING on the -27. Hot air bled from the compressor warms hollow parts of the nose, inlet vanes and struts. Inlet air screens retract at the touch of a button to eliminate the last icing problem. The retraction of the screens also eliminates a loss of thrust.

GENERAL ELECTRIC

NEWS DIGEST

New Plane Program Proposed by APB

The DPA's Aircraft Production Board has rocked the Air Force and Navy with these recommendations:

- Cut back Republic F-84G production in favor of the F-84F.
- Keep North American F-86F production going at the expense of other fighter types until the North American F-100 supersonic fighter goes into production.
- Stop Northrop F-89 production.
- Stop Lockheed F-94C production.
- Concentrate on F-86D production until the Convair F-102 delta-wing supersonic interceptor is in production.
- Build up Boeing B-52 long-range eight-jet production at the expense of other long-range bomber programs.
- Finish present Martin B-57A Canberra production schedules.
- Boost Douglas B-66 (Navy A-3D) production. This plane is superior to any other such type now in production, but won't go into production itself until completion of Canberra schedules.
- Continue Boeing B-47B and C production, on present heavy schedules.
- Stop Grumman F-9 series production as soon as possible.
- Replace it with the McDonnell F-2H.
- Then build McDonnell F-3H production, which should also replace production of the Grumman F-10F, now testing at Edwards AFB.
- Stop Douglas F3D interceptor production as soon as it's replaced by F4D-1. The F3D is not considered wholly satisfactory.
- Phase in the Douglas F4D-1 Skyray interceptor as soon as possible.
- Cancel piston-engine aircraft contracts as soon as turboprop engines are in major production. Engineering and development should be concentrated on this—especially the Allison T40 turboprop engine.
- Start Douglas A2D attack bomber production as soon as possible to replace the prop-driven Douglas AD series.

The Aircraft Production Board is only prodding and recommending Air Force and Navy action so far, but it has the power to force action. AF and Navy are studying the recommendations, made by the board July 9.

CHUTING TO A HALT—New Lockheed F-94C Starfire all-weather fighter has popped its tail chute to augment its wheel brakes in bringing the speedy jet fighter to a halt after landing. Chute is housed in special compartment in tail. First all-rocket armed fighter in production (Aviation Week July 7, p. 16), F-94C carries 24 Mighty Mouse 2.75-in. missiles in ring of tubes around its nose.

Domestic

Civil aircraft shipments totaled 2,477 planes during 1951 aggregating 5,111,000 lb. airframe weight, a 14% decrease in weight and 11% decrease in number over 1950 shipments. Unfilled orders for planes weighing 3,000 lb. and over totaled 719 aircraft at the end of 1951. There were 4,580 civilian engines shipped last year valued at $25.9 million. Average monthly employment in military and civil aircraft plants last year was 300,363.

Port of N. Y. Authority has awarded $1,655,450 contract for work on new Newark Airport passenger terminal and a $200,000 contract for hangar doors at Idlewild Airport.

Steve Bennis was named 1952 Northeastern States Soaring Champion at end of three-day meet at Elmira, N. Y. He amassed 199 points. His best flight was from Elmira to York, Pa., 146 mi.

Gen. Hoyt Vandenberg, USAF Chief of Staff, visited his office July 9 (for the first time since he underwent surgery May 7). He was at his desk about an hour and a half.

Hiller Helicopters has delivered a UH-12B copter to Sangyo Keisai Shimbun, newspaper publishers at Tokyo and Osaka, Japan. Firm plans to use craft for news gathering, photo work and executive transport.

"Fear of flying" has caused separation of 86 officers from USAF in the last three months, Air Training Command has disclosed. Backlog of cases totaled 159. Cases had "tapered off" said an ATC spokesman.

Boeing Aircraft Co. engineers, represented by Seattle Professional Engineering Employees Assn., voted 99.7% to reject a company offer providing a 6% general raise and modified overtime formula. SPEEA had requested a general raise "in order to compensate for the gradual devaluation of professional salaries during the last 13 years." The group also requested time and a half for overtime.

Navy supercarrier USS James V. Forrestal keel-laying ceremonies last week were marred by USAF officials' apparent refusal to attend. The 60,000-ton craft is slated for completion late in 1954, will cost over $220 million.

Financial

Delta Air Lines has declared a 25-cent quarterly dividend per share payable Sept. 2 to holders of record Aug. 15.

Pacific Airmotive Corp., Burbank, reports sales exceeding $14 million for the six months ending May 31, a 56% gain over similar period last year. Net profit for the current period was more than $483,000 after provision for federal income taxes.

International

DH Comet landed in Tokyo July 8 after 10,404-mi. route proving flight from London in 27 hr. 22 min. flying time.

Universal Postal Union has cut international air mail rate effective next July 1 from the present average of about $2.38 per mail ton-mile to $1.43 for intra-European service and $1.91 for other routes. Under new system, U. S. lines will get about $6-$7 million annual foreign postal revenue compared with about $11 million which they received last year.

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AVIATION CALENDAR

July 25-26—Silver anniversary celebration, Parks College of Aeronautical Technology, Parks Airport, East St. Louis, Ill.

July 26-27—New England Soaring Meet, Lawrence Airport, North Andover, Mass.

July 30-31—University Aviation Assn. fifth annual meeting, Ball State Teachers College, Muncie, Ind.

Aug. 11-13—Society of Automotive Engineers national West Coast meeting, Fairmont Hotel, San Francisco.

Aug. 27-30—National Flying Farmers convention, Alabama Polytechnic Institute, Auburn, Ala.

Aug. 30-Sept. 1—International Aviation Exposition, sponsored by Aero Club of Michigan; including Continental Motors Trophy Race; Wayne Major Airport, Detroit.

Sept. 1-7—Society of British Aircraft Constructors annual display, Farnborough, England.

Sept. 4—Centennial of Engineering banquet, Hotel Knickerbocker, Chicago.

Sept. 5-7—Preconference instrument maintenance clinic, Instrument Society of America national instrument conference, Case Institute of Technology, Cleveland. Send advance registrations to P. V. Jones, Instrument Society of America, Pittsburgh 33.

Sept. 8-12—Instrument Society of America seventh national instrument conference and exhibit, Cleveland.

Sept. 14-23—Aeronautical Fair, Forlanini Airport, Milan, Italy.

Sept. 15-19—International Air Transport Assn., eighth annual general meeting, Geneva, Switzerland.

Sept. 29-Oct. 1—National Electronics Conference, Sherman Hotel, Chicago.

Oct. 1-4—Society of Automotive Engineers national aeronautic meeting, aircraft engineering display and aircraft production forum, Hotel Statler, Los Angeles.

Oct. 9-10—Airport management operations conference, Oklahoma University, Norman, Okla.

Oct. 11-18—Fourth annual All-Texas Air Tour; information available from Texas Aeronautics Commission, Austin.

Oct. 25-Nov. 2—International aviation and travel exposition, Navy Pier, Chicago.

Oct. 28-29—Transport Aircraft Hydraulics System Conference, sponsored by Vickers, Inc., Hotel Park Sheraton, Detroit.

Nov. 6-7—National fuels and lubricants meeting, Society of Automotive Engineers, The Mayo, Tulsa, Okla.

Dec. 2—Symposium on light metal heavy forgings and extrusions for modern aircraft, Society of Automotive Engineers, Hotel Statler, N. Y.

Dec. 4-6—Sixth annual Arizona aviation conference, jointly sponsored by Bisbee and Douglas Chamber of Commerce, Douglas, Ariz.

PICTURE CREDITS

7—Lockheed; 9—(top) Boeing Airplane Co.; (center) Lockheed; (bottom, left) British Information Services; (bottom, right) McGraw-Hill World News; 14—(center, bottom) McGraw-Hill World News; 22-24—Piasecki Helicopter Corp.; 38—Batchelor-Plath Inc.; 42—McGraw-Hill World News; 81—Curtiss-Wright Corp.

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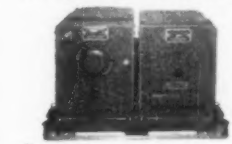

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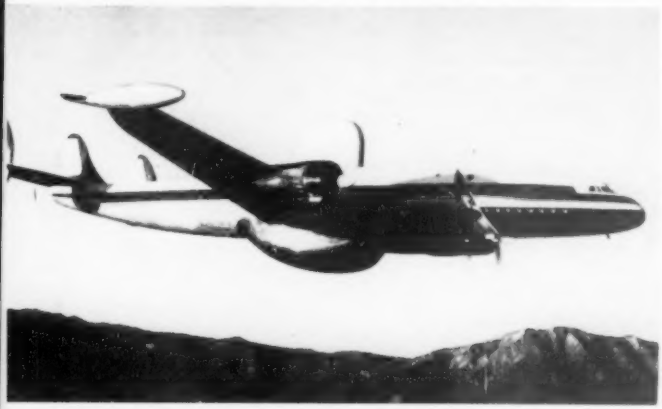
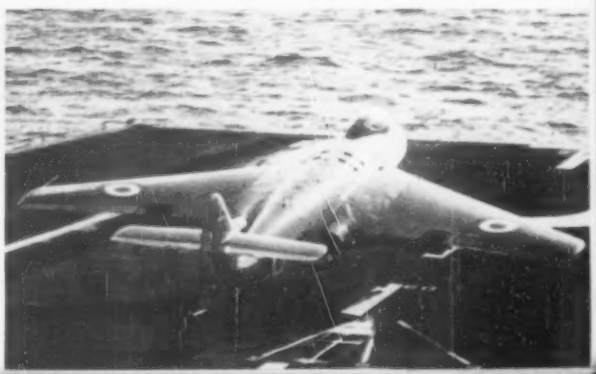
STRATOJET OVER KANSAS—Sleek, efficient looking Boeing B-47B Stratojet, complete with external wing fuel tanks, is captured in this unusual view while flying above clouds over the Midwest. Latest model of the high-priority medium bomber can be air-refueled.



The Week's Plane News In Pictures

SKY PICKET—Lockheed WV-2 Super Constellation (left) during a flight test of its unusually large radomes, atop and below fuselage, also displays new auxiliary fuel tanks on wingtips. New Super Connie's mission is to act as a flying early warning radar picket station, extending normal range of ground-based radar warning "fence." As such, the WV-2 is fitted with numerous and complex devices for detecting invading forces, then transmitting information to ground or ships. Lockheed uses this particular Super Connie as a flying laboratory.

BRITISH JETS TRY SEA LEGS—Production-model Hawker Sea Hawk (below, left) and sweptwing experimental Hawker P. 1052 (right) are pictured during recent carrier trials aboard HMS Eagle. The Sea Hawk warms up, the P. 1052 is seen being catapulted.



INDUSTRY OBSERVER

(Editor's note: Following industry observations were made by AVIATION WEEK *editors touring Midwestern and West Coast plants in connection with the Aviation Writers' Assn. convention.)*

► Douglas F4D Skyray Navy interceptor is wearing a swordfish-like probe on the end of its droop-snoot nose for instrumentation of its very high speed flight tests, but this will be replaced by a radar nose installation.

► **Watch for Lockheed to jump into the jet transport field with a public announcement of its new plane within the next 90 days. Indications are that it will not be a thin straight wing plane, as had been reported earlier, but will have a thicker swept wing because of fuel storage problems. Speed probably will be in the more-than-600-mph. range.**

► Boeing B-47 jet bombers flying around Wichita are not using their big drogue parachutes all the time. In spite of the hot landing speed of the B-47s, they have been landing without the aid of this auxiliary brake. One thing making this possible is the fact that the main Wichita runway now has been extended to 12,000 ft., making it one of the longest.

► **Douglas AD-4W Skyraider early warning plane carries a crew of three, and an 8-ft. dia. radar scanner. This gives the plane a capability of covering a wide area from altitudes up to 20,000 ft.**

► Pacific Airmotive Corp. has put price-tag range $86,350-$89,350 on various versions of the de Havilland Dove executive transport. Flyaway Linden, N. J. (PAC's East Coast base) prices include import duty. PAC is carrying a large stock of spare parts, engines, propellers and accessories for the British plane and expects to meet the objections raised about replacement parts for foreign-built planes in the U. S.

► **Bob Prescott, Flying Tiger's president, looks for airfreight really to come into its own when efficiently operating turboprop planes are available. He wants one in the vicinity of 150,000 lb. gross with a 50,000-lb. payload and enough range for trans-Atlantic nonstop with that load. It may be 1960 before turboprops are in standard operational service, though, he thinks, and meanwhile piston-powered freighters like the Douglas DC-6A appear to be the best answer.**

► McCulloch Corp. at Los Angeles hopes to finish up CAA certification soon on its little MC-4 tandem rotor helicopter. Five of the machines are being built for Navy evaluation as trainers. Demonstration of the MC-4 at Los Angeles Airport showed the cleanly designed prototype to be fast for a rotorcraft, probably in the 120-mph. class, and capable of performing with the full agility and flexibility of maneuver that is the helicopter's main asset. The McCulloch definitely appears to be a machine to be reckoned with in the helicopter competitive field.

► **The old Bell description of the World War II P-39 Airacobra as the "flying engine with an airplane built around it" applies even more so to the fast-climbing new Douglas F4D Skyray jet interceptor. It looks like the minimum amount of package that could be wrapped around the new Westinghouse J40-6 engine and afterburner and still contain the necessary fuel tanks, accessories and equipment to operate such a speedy craft.**

► Navy Ordnance test station at Inyokern is one of the best examples of unification in aviation yet. The big rocket firing range is used almost interchangeably by Air Force and Navy planes for tests. Among recent Air Force tests were some 55 flights and firing of more than 1,000 rockets in tryouts of the Lockheed F-94C Starfire nose rocket installation.

► **Close competitive situation between the operational Grumman F9F Panthers and McDonnell F2 Banshees is emphasized with disclosure that both Navy jet fighters have almost identical Mach number compressibility limitations. Both planes are red-lined at slightly over Mach 0.8, with the McDonnell plane having a very scant advantage.**

► Los Angeles International Airport is still working out problems with its Fido system to burn fog off the airport. Results of the latest series of eight tests with the oil burning system have been reported back to ATA for further technical evaluation by the airlines.

WHO'S WHERE

In the Front Office

Nelson David, formerly Pan American World Airways' regional director, Central Europe, is joining Alaska Airlines as president and general manager.

D. K. Tasker has been named executive assistant to vice president-assistant general manager of Republic Aviation Corp. Tasker organized and directed P-47 field service in World War II, has managed the company's experimental activities at Edwards AFB, Calif., for the past three years.

Changes

W. O. Meckley has been named manager of engineering and **H. M. Wales** has been made manager of sales for General Electric Co.'s newly formed Accessory Turbine organization at Lynn River, Mass. **T. N. Ferren** has been appointed superintendent of manufacturing at the facility; **F. W. Dahlberg,** facilities engineer; **J. W. Shirley,** production manager, and **A. C. Eastman,** supervisor of inspection.

Kenneth A. Koyen, formerly assistant director-public relations for United Aircraft Corp., has been designated public relations manager at Pratt & Whitney Aircraft. He succeeds **Robert B. Hotz,** who is returning to AVIATION WEEK (see p. 96).

J. L. Hammond has been named director of commercial sales for Sperry Gyroscope Co., Great Neck, N. Y.

Donald S. Campbell has been named technical representative for AiResearch Mfg. Co., Los Angeles, with headquarters in London, on assignment with Joint Military Assistance Group of MDAP.

W. L. (Larry) Trimble, European region director for TWA, also has been made director of the Middle and Far East regions, all of which have been combined. He will continue to maintain headquarters in London.

Warren E. Kraemer, formerly assistant to the president of Braniff Airways, has been named general traffic and sales manager for Scandanavian Airlines System.

Don W. Martin, formerly manager of New Castle County Airport, Wilmington, Del., has been designated manager of Oakland (Calif.) Municipal Airport. He will start his new post Sept. 1.

What They're Doing

S. S. Tyndall has left the public relations and advertising firm of Hill & Knowlton and set up his own business, S. S. Tyndall & Associates, 50 E. 42d St., N. Y. 17. He will direct public relations for National Airlines.

James Labagnara, president, and **Alex Roskowski,** vice president of Precision Gears & Products, Inc., Paterson, N. J., are flying to Switzerland July 27 to inspect facilities of Swiss makers of precision gear equipment.

Wherever Man Flies

Hamilton Standard's long experience as the leader in propeller design and production is also devoted to supplying other equipment for such outstanding airplanes as the North American FJ-2 and F-86D jet fighters for the Navy and Air Force.

HAMILTON STANDARD

PROPELLERS ★ STARTERS ★ AIR-CONDITIONERS ★ FUEL CONTROLS ★ AUXILIARY DRIVES ★ HYDRAULIC PUMPS

Remington Rand Methods News

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Employee relations are bound to suffer if your personnel people have their hands tied by clumsy paperwork. Let us show you how other plants expand and contract the working force as needed, without upsets or waste of talent. How specific skills and experience can be quickly located within your organization. How 80% of all phone inquiries to personnel department can be answered in seconds. How control can be maintained over punctuality, vacations, service pin awards, etc. How a complete *visible* picture of each employee can aid you in merit rating and counseling.

These and other profitable procedures are shown in our manual of personnel administration **X-521**; an easy way for you to change over NOW to more efficient records is shown in folder **BSD-2**.

The costly way to learn this lesson

Did you hear about the plant fire in which loss on building and contents was only $27,000, but the loss on plant records ran to more than $50,000? It turned out that the standard fire policy did not cover their cost of reconstructing the lost or damaged inventory cards and engineering drawings.

The moral for management is plain. Don't depend on insurance alone for promptly resuming operations after the firemen leave. It pays to provide *insulated* protection for vital operating records at point-of-use.

We will be glad to help you determine exactly the protection your records need, considering building construction and existing hazards. Ask for our useful booklet on the cost of burned records, **SC-707**.

Saves engineering time and talent: Here's how anyone can quickly make photographic "tracings" and copies from pencil drawings, blueprints, vendor specifications, etc. Old drawings can be restored; new ones can be saved from smudging or wear and tear. Details can be revised without retracing and checking the entire drawing. See how many other ways you can profit from the *versatile* Portagraph contact printer (in wide range of sizes). Ask for new folder **P-305**.

Where do you start in production control?

High set-up costs may stem from poor materials control

"Hot lists" and costly emergency machine set-ups can often be traced back to rule-of-thumb requisitioning of raw materials and parts. If your production control should *begin* with the materials, we offer you a new cost-cutting approach to the problem of dependable supplies and smooth-flowing output.

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Tailor-made: This system can be profitably adapted to your special needs—large plant or small. And Remington Rand will take full responsibility for the *complete* system: all the forms, equipment and services you need. Let us show you how it works; read our manual on production control **X-1263**. Get more details by asking to see our folder **MC-767**. And see in folder **BSD-6** how we can even tabulate your requirement lists from your own bills of materials.

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AVIATION WEEK VOL. 57, NO. 3
JULY 21, 1952

U.S. Funds Will Aid Europe's Air Industry

- **Britain to get big boost from off-shore buying.**
- **Italy, Holland also will build planes for NATO.**

By Nat McKitterick
(*McGraw-Hill World News*)

London—The $225-million U. S. off-shore procurement program will be the first real effort to coordinate European aircraft production. And it appears obvious Great Britain is slated to get the biggest boost from the program.

First U. S. off-shore buying dollars will make possible a big production increase of three British plane types—Supermarine Swift, Hawker Hunter and de Havilland Venom—in three different countries, Britain, Holland and Italy.

NATO's Defense Production Board, under chairmanship of William Batt, who doubles as Mutual Security Agency chief in London, is awaiting Washington approval to draw up specific contracts involving $225 million in off-shore purchases and matching funds from European NATO members.

▶ **Conditions**—U. S. money will be committed on two conditions:

- **Planes must be delivered** by the end of 1955.
- **No scarce tools** will be provided from the U. S.

Several weeks ago NATO countries were asked by U. S. what they would offer in the way of increases in aircraft production against this money. The British, hitherto regarded as too fully committed to air rearmament to take advantage of off-shore purchase opportunities, surprised everyone by jumping at the chance. British leaders offered to increase Hawker Hunter production against U. S. purchase of a certain amount of the increase.

The British and Dutch then came forward with a license agreement to make the Swift airframe in Holland. The Dutch have a potential excess of aircraft capacity now that production of Meteors under license at Fokker is coming to an end. The Dutch now are bidding for off-shore purchase of Swift airframes.

▶ **Italian Venom**—Next, Italy offered to supply the NATO air force DH Venom night fighters, already licensed by Fiat and Macchi for assembly and Ambrosi for spares. First Italian Venom is close to delivery now and there is substantial surplus capacity available for increased production.

The French are not likely to figure in short-range plans. Prohibition against supplying tools from the U. S. means little likelihood of getting Mystere, Mistral and Ouragan programs off the ground within the 1955 time limit. U. S. already had pared down considerably the French request for aircraft machine tools for these planes as unrealistic.

The French are plugging seriously for a long-range development of an aircraft industry in North Africa in cooperation with the Germans—sort of an aviation Schuman Plan. This is outside the immediate off-shore purchase picture, however.

▶ **Only Fighters Now**—The Belgians are trying to get into the act by pressing Britain for an Avon license to supply powerplants for Swifts built in Holland. (Belgium now is supplying Dutch-built Meteors with Rolls-Royce Derwents produced under license.) But the British are cool to licensing the Avon on the Continent, both for security reasons and on grounds it is too difficult to produce there. Actually, a considerable

Defense Sees Delay in Plans

Defense Department officials said last week that any definitive program for the commitment of $225 million through Mutual Security Agency to bolster European aircraft production is at least three months away.

This disclosure was made following Ambassador William H. Draper's statement in Paris that he "has been authorized to advise the North Atlantic Council and its Secretary General that the United States government approves in principle the proposals of the NATO international staff for the coordinated production of aircraft in Europe."

Draper said that the U.S. is prepared to meet the recommended share of U.S. off-shore procurement for these planes up to $225 million provided that European governments concerned will put up their allocated share of $175 million.

▶ **Figures Don't Jibe**—Causing some confusion in Mutual Security Administration offices in Washington was a later announcement from Draper's Paris office that the total aircraft procurement would probably reach approximately $500 million instead of $400 million and that the ultimate U.S. share would be upwards of $250 million. MSA officials in Washington were unable to explain the discrepancy in the figures.

However, Department of Defense said that if there should be a requirement for more funds because of "follow-on" commitments in rounding out the program that they could only be presented in next year's Defense Department budget—and not before. The department declared that $225 million is the maximum authorized by Congress in the fiscal 1953 budget.

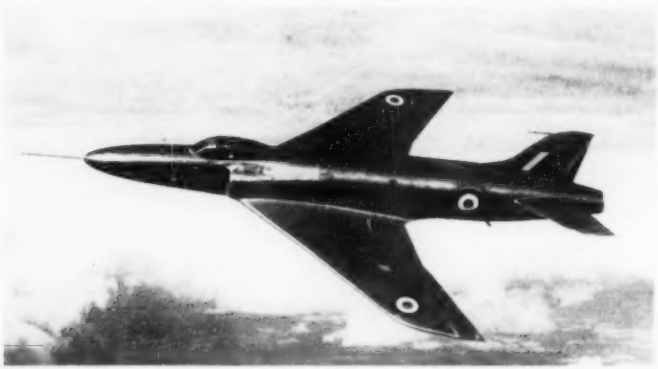
Defense Department said the Joint Chiefs of Staff were just now considering the overall program in view of the 10% slash to $225 million imposed by Congress for fiscal 1953. Further, it was pointed out, Great Britain now has joined the ranks of the NATO governments seeking a share in this program. Major would-be recipients previously had been France, Italy and Holland.

▶ **Six Months Away**—Minimum time for revision of the off-shore procurement program by the JCS in view of the congressional 1953 budget slash will require at most three months, and it will take more than six months to iron out details, a Defense Department official declared.

Draper, in view of the considerable objection both in military and industry circles to the MSA program, was careful to point out that "approval of the proposals does not include any U.S. commitment concerning deliveries of scarce U.S. tools and materials to countries producing aircraft."

For Off-Shore Procurement . . .

DE HAVILLAND VENOM. Italy is building Venoms under license from British.



SUPERMARINE SWIFT. Dutch will supply Swift airframes under British license.

HAWKER P. 1067 HUNTER. Third British fighter in off-shore buying program.

surplus of Avons is now piling up in Britain as the result of airframe delays and opening a new Rolls-Royce Avon line in Glasgow.

Only fighters are on the off-shore purchase list now. The Gloster G.A. 5 delta wing fighter, second prototype of which is to fly shortly, was left off the list as unlikely to be available in sufficient quantity by the 1955 deadline. The British did not offer the Canberra. Britain already is committed to supply considerable numbers of Canberras to NATO on its own. And top priority for fighters has resulted in some flattening out of Canberra production. Plans for long-range Canberra intruder type, modeled after the Martin Canberra, have been scrapped.

▶ **Britain's Share**—As predicted in AVIATION WEEK Feb. 25, the stretchout in U. S. production has made possible from a delivery standpoint the off-shore purchase in Britain of completed aircraft. But skilled labor still is very short in Britain, despite an industry recruitment rate of 3,000 a month since January.

Key machine tools, many ordered in U. S. very early in the game, are arriving on schedule—slightly ahead of requirements. But "super-priority" for a few types plus extensive subcontracting now is making industry production targets realistic.

Decision to buy completed aircraft for NATO in Europe with off-shore dollars ends a long policy wrangle in Washington. Until last spring defense chiefs were dead set against the idea, but the stretchout pulled the rug out from under the major argument—that Europeans could not deliver in time.

▶ **Reaction at Home**—Defense chiefs still are worried about spending anything in Europe that might jeopardize the U. S. program. That is why Air Secretary Thomas K. Finletter, on his recent trip to Europe, insisted the U. S. bar any further machine tool aid to European aviation.

But Britain, Holland and Italy came up with offers to match U. S. aid, despite this condition, thus getting long-talked-of integration of European aircraft production off paper for the first time.

Defense Obligations

Air Force obligated $13.8 billion during the 11-month period July, 1951, through May, 1952, against Army's $13 billion and Navy's $9.7 billion, Defense Department said in a yearend roundup. Of the $30.5 billion obligated for defense hard goods during the period, $2.9 billion went into the Mutual Security Assistance Program. During the 23-month period since Korea, AF obligated $27.1 billion, Army $26.8 billion and Navy 18.2 billion.

Strong Carrier Force Is Urged

Floberg says mobile bases provide element of surprise and cites Navy Air successes during World War II.

By Ben S. Lee

U.S. multi-million-dollar investment in overseas air bases is worthless unless it is backed up by a strong Naval Air carrier force, John F. Floberg, Navy Air Secretary told the aviation press last week.

In an address before the 14th annual convention of Aviation Writers' Assn., Floberg decried the self-hypnosis with which the average U.S. citizen focuses his attention on the construction of U.S. air bases along Russia's perimeter of defense.

▶**A Military Problem**—"All too often," Floberg said, "the concept of control of the air is reduced to an arithmetic problem—how many total airplanes we have as compared to how many total airplanes someone else has." The problem is not arithmetic but military, with arithmetic furnishing only a factor in the problem. Basically the problem boils down to how many aircraft of the right types and performance are present at the point of contest.

To emphasize the need for more carrier aviation and its inherent ability to reduce enemy odds by the element of surprise, Floberg said, "After Iwo Jima in the six months before the atomic bombs were dropped, U.S. carrier striking forces destroyed over 5,000 aircraft over Japan at a rate of 800 per month."

"This result," he said, "was accomplished by a force which never had more than 1,500 carrier-based aircraft at any one time, but its ability to move its area of operations and to choose the time and place of combat with an overwhelming local superiority of force enabled it to achieve an approximate 14-1 ratio over enemy losses to its own."

▶**Efficiency Reduced**—However, elements of these same fleet air units, while operating afloat, on occasion were shore-based. During these periods, the same groups which had made the 14-1 ratio record had their combat kill efficiency cut to a 7-1 ratio because fixed-base operation virtually eliminated the element of surprise.

"Everyone is conscious of the fact that a fast task carrier force has the ability to move six or seven hundred miles in a twenty-four hour period and to project its air power almost as far again from its point of surface location.

"On our East Coast we have a series of industrial and commercial centers, commencing at Portland and Portsmouth and running south through Boston, Hartford, New York, Philadelphia, Baltimore, Washington, Norfolk, Charlestown, Jacksonville, and Miami. Each of these major centers is sufficiently removed from its neighbor so that no two of them could easily furnish effective mutual support in the event of heavy enemy air attack from the sea.

"And yet, in order to have an equal number of aircraft at each of these places to combat a task force of eight carriers, each of these cities would have to have 800 aircraft based around it and immediately available." At these 12 locations alone a total force "arithmetically" of 9,600 planes would be required.

▶**Carrier Craft Need**—Presently, Floberg explained, this country has a virtual monopoly on one major weapon in the modern military arsenal—sea-borne air power.

"This capability, which is unmatched in the world, gives us the opportunity for initiative if we are ever called upon to exercise it, but to take advantage of this principle it will be necessary for the American people to press for more carrier air with which to increase this fundamental strength."

He warned however, that the current absence of significant surface fleets of the enemy has lulled the average American to a sense of false security. "All too few people realize how close we came in both great wars to losing that control.

"In both these cases it was critically jeopardized in the Atlantic without any appreciable enemy surface forces ever being at sea."

▶**What It Means**—"Some conception of that degree of threat may be inferred," he said, "from the fact that over 24 million tons of Allied shipping were sunk during World War II." This would be the equivalent of about two-and-one-half ships of 5,000 tons each per day throughout the war—or a Victory ship a day for five and one-half years.

Eighty-two percent of these ships, he said, were destroyed by submarine and aircraft of the German navy. Yet this degree of loss was achieved by an enemy which began a major war with somewhere between 30 and 60 submarines and a few thousand aircraft at their disposal.

Comparison with those minor enemy forces of World War II to what today's aggressor with known submarine forces of three or four hundred craft and many thousands of aircraft is staggering, Floberg said.

Thermals Blamed In Banshee Crash

Navy officials analyzing the recent crash of a Navy F2H-2 Banshee at Inyokern, Calif., are expected to find that it was caused by a combination of gust and extreme "G" load during pull-out from a dive too near the ground.

The plane came apart in the air. Tentative conclusion was that it encountered a severe thermal gust as the pilot tried to pull out of the dive in a maneuver that about doubled the Banshee's allowable "G" loading. A theodolyte camera trained on the plane provided unusually accurate data for the analysis.

The crash occurred during normal practice maneuvers being demonstrated to members of the Aviation Writers' Assn. attending their 14th annual convention at Los Angeles.

▶**Severe Thermals**—The plane started its pullout at about 200 ft., considerably below the level used by others making similar runs, witnesses agreed. Speed was not a factor, as it was estimated substantially under the plane's Mach limit. The excessive load of the pullout combined with the impact of a strong thermal gust was the sole cause, officials believe.

Navy officers flying out of Inyokern after the event reported extremely severe thermals in the area.

The planes were firing 2.75-in. folding-fin rockets (FFAR) during the target practice. The dive angle was approximately 17 deg. The pullout was severe.

The pilot, Lt. Cdr. John E. Darden, had experience in the F2H-type plane, and had done some flying with the McDonnell Phantom.

Officials of the Inyokern base reported this was the first accident of this kind at the base.

▶**Navy Experience**—A McDonnell spokesman says F2H-2 pilots returning from Korea war duty report having safely exceeded the plane's "G" and Mach limits on occasion. As to the plane's carrier operations performance, a Navy Banshee squadron commander told AVIATION WEEK his outfit lost only one plane on two cruises, and hit no deck barriers. The lost plane exploded in the air from an unknown cause.

McDonnell switched its F2H-2 fighter version to production of the larger, radar-packed long-range F2H-3 series in April. Production of F2H-2P reconnaissance version is continuing, however.

Defense Needs More Scrap
Put Your Scrap Back to Work

Standard Defense Catalog Is Pushed

A new government agency last week was getting squared away to tackle a job that may drastically change present industry-Air Force-Navy procedures for drafting aeronautical standards. And it may also change the Air Force's current method of keeping track of its supplies.

In its closing days, Congress enacted a law establishing the Defense Supply Management Agency within the Defense Department. Purpose was to put into law authority exercised under departmental rules by the Supply Management Agencies of the Munitions Board. Two units in the SMA, the cataloging agency and the Standards Agency, for several years have been performing the functions now assigned to the new Defense Supply Management Agency. But there is expected to be a great difference in how they are performed.

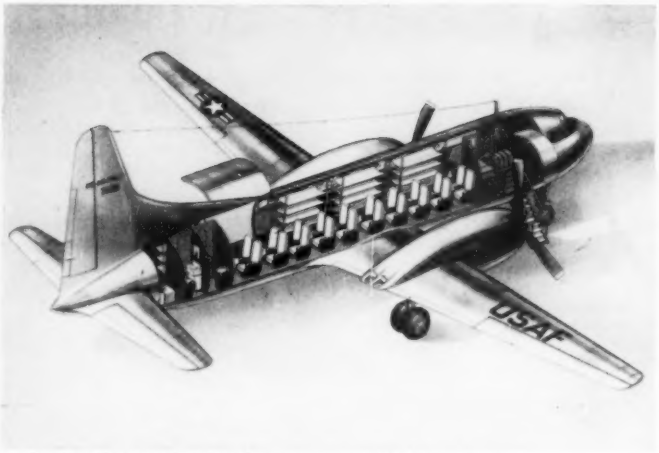
► **The Legal Authority**—The Munitions Board Standards Agency has been working closely with the Aeronautical Standards Group, a separate unit in the Defense Department. ASG, in constant consultation with the industry, had a fairly free hand in setting aeronautical standards. The Munitions Board's Standards Agency had no clear-cut legal authority. Now it has, and some industry experts expect it will play a much larger role in establishing aeronautical standards—although it is too early to tell what that role may be or its effect on the industry.

The move to enact the law setting up the Defense Supply Management Agency was touched off by a congressional investigation of the armed services' supply catalogs. Congressmen were disturbed at a seeming duplication in supplies arising from differing classification systems of the Air Force, Army and Navy.

► **Single Catalog**—One of the primary reasons for establishment of DSMA was to give statutory standing to a "single supply catalog" which would have to be used by all three services. This could very well mean a thorough overhaul of the Air Materiel Command's present system of classifying and listing its supplies.

Head of DSMA is Rear Adm. J. V. Fowler (Ret.), who has been director of the Supply Management Agencies of the Munitions Board. He spent most of his Naval career with the Bureau of Ships as an expert on industrial management and after retirement in 1948 opened a private industrial consulting firm.

Fowler attracted favorable comment among congressmen during the investigation and Congress in effect ordered his appointment as director of the new agency.



CUTAWAY DRAWING of MATS' new Convair C-131 evac transport.

MATS New Evacuation Transport

Delivery of the first in a fleet of Convair C-131 military air evacuation transports to Military Air Transport Service is scheduled early next year.

The twin-engine pressurized plane will carry 27 litter patients or 40 ambulatory cases and will be placed in operation on continental medical evacuation air routes in the U. S. It is a special version of the commercial Convair 240, with a cruising speed of 285 mph. and range of more than 1,000 mi. at 16,000 ft.

Features of the air evac version:

- Rearward facing seats capable of withstanding 9-G deceleration load. (This is the first of the production versions ordered by MATS with these seats as original equipment under a recent requirement providing that all future MATS transports will be equipped with rearward-facing seats for the safety factor.)
- Plane is air conditioned with provisions for ducting ground heat or ground cooling into the plane when parked.
- Auxiliary power unit is to be placed forward, cutting cabin noise and preventing fumes from entering patients' compartment.
- Exterior of cabin roof will be coated with white solar-resistant lacquer to reflect heat, resulting in a cooling factor of 8 deg. in the interior.

Powerplants are two Pratt & Whitney R2800-52W engines rated at 2,400 hp.

Gross takeoff weight of the plane is more than 34,000 lb. Dimensions: span, 91 ft. 9 in.; length, 74 ft. 8 in.; height 27 ft. 3 in. It is intended to replace MATS C-54M and C-47 air evacuation planes on domestic routes. The latter will be transferred for other uses.

Grand Jury Issues Crash Findings

No evidence indicating gross negligence as the cause of the three tragic airliner crashes into Elizabeth, N. J., has been found by the Union County (N. J.) Grand Jury empaneled to investigate the accidents. But jury members determined that CAA has "minimized repeated safety violations on the part of a single carrier and its enforcement policy . . . thereto has been too liberal."

The Grand Jury found that administration and enforcement of aircraft safety rules and regulations by CAA should be intensified. It was noted that CAB has initiated corrective regulations designed to eliminate sources of danger disclosed by the three crashes.

The jury also recommended that prior to a commercial air carrier being granted a certificate of authority by the New Jersey Bureau of Aeronautics, it adhere to these qualifications:

- Appoint an agent in the state to accept service of civil and criminal processes.
- Submit evidence of financial stability and responsibility.
- Submit evidence of available funds to indemnify against damage to persons and private property.

The jury recommended that the Bureau of Aeronautics license all airports in the state. It also proposed that the

exemption now carried in Section 902, CAA Act of 1938 which prevents criminal prosecution on the part of the U.S. Attorney for violations of Titles 5, 6 and 7 of the Act be deleted so that U.S. Dept. of Justice and U.S. Attorneys can initiate criminal prosecutions.

Committee Charges Manpower Waste

Senate Armed Services Preparedness Committee lashed out at the Air Force and other military services for exorbitant waste of manpower and inefficiency in a report last week on utilization of manpower by the armed services.

The committee declared that during the four years preceding the outbreak of hostilities in Korea, the nation had spent approximately $5 billion a year on military personnel costs, 40% of the defense budget.

At the same time only about $2,125 million a year was spent on aircraft, ships, weapons, and ammunition. This, the committee said, represented only some 18% of the total defense budget.

"A 10% cut in the spending for military hardgoods," the committee said, "would have amounted to savings of $212,500,000. But a 10% cut in the spending for personnel would have amounted to savings of $500 million. Spread over the four-year period, the manpower saving would have arisen to $2 billion–a sum which we could well use now."

▶ **Manpower Waste**–The committee emphasized that it was not recommending a 10% cut in manpower, that such a cut "would not serve the ends of economy." But the committee said waste of manpower within the armed services should be fully explored by the respective departments because "the possibilities of savings in this field are enormous."

In the case of the Air Force, it was revealed, a fighter wing exists to put 75 jet aircraft into the air. Currently, to perform this mission USAF provides 1,688 men. This means that some 22 men are required per plane and that less than 4% of this number are pilots.

The committee declared that a fighter wing presently requires 423 men in clerical, personnel and motor transport assignments. "It is difficult to believe that experienced management would be unable to reduce these jobs without impairing the efficiency of the wing's performance. The 'old Army game' of using five men to do the work of one does not appear to have been discarded when the Air Force divorced the Army."

▶ **Bomber Wings**–The same situation is true in reference to a bombardment wing, the committee said. Using a medium B-50 bombardment wing as a typical case, it was pointed out that the present requirements for wing complement of 3,860 men is excessive. The medium bombardment wing requires 279 crewmen plus 94 pilots to man the planes. This combat strength means that fewer than one-tenth of the personnel are required to man the planes, that there are 41 men per pilot in the wing.

"Perhaps all of these men are essential and can be justified," the committee said. "We doubt it."

Steel Shortage May Slow Plane Output

The steel alloys shortage due to the steel strike will cut dangerously into production and deliveries of individual airframe and engine components about mid-August, the Aircraft Industries Assn. believes.

Substitution of some sizes and shapes already has been necessary; but production is not slowed noticeably yet, it is merely made more cumbersome by the need to machine odd sizes to specifications.

The AIA tried to make a survey to pinpoint where and when the drastic shortages would hit first, but found making a prediction impossible. It is a matter of drying up of individual warehouse stock: The demand fluctuates, so predicting rate of drainage of each of the thousands of items month by month is impossible, AIA found.

Effect of the shortage on actual airframe and engine production has been staved off so far by three factors:

- **Supply pipelines** were generally full on June 2, when the strike hit.
- **Substitutions** are holding off serious trouble in the spot shortages.
- **NPA order** prevents warehouses from selling abnormal stocks.

The NPA order allows one buyer a maximum withdrawal of 5,000 lb. per month on any one size or shape of steel alloy. Exceptional requirements–over 5,000 lb.–are handled by special NPA directive. Beadix, for instance, came in for such directives last week.

Meanwhile, NPA has issued a regulation allowing steel producers to delay deliveries beyond date promised. This order merely recognizes the fact that companies may be unable to make promised dates, even on super-priority orders.

AIA's materials specialist, William Smith, figures the mid-August danger point this way: There is generally enough stock to take the industry through to July 26, except for spot shortages. Then the vacation and inventory period starts. Thus, the pinch should become severe about the second or third week in August, he predicts.

Steelman Names Defense Advisors

Roster of the Advisory Committee on Production Equipment has been completed by Dr. John R. Steelman, Acting Director of Office of Defense Mobilization. The group, set up to advise ODM and other government agencies on production equipment for aircraft and other defense needs, includes:

Harold S. Vance, president of Studebaker Corp., chairman; Clay Bedford, president of Chase Aircraft; Adm. W. E. P. Blandy (Ret.), Health and Information Foundation; Gen. Leroy Lutes (Ret.), Pacific Tire and Rubber Co.; Lt. Gen. K. B. Wolfe (Ret.), President, Oerlikon Tool and Arms Corp.; Manly Fleischmann, DPA consultant; Lewis L. Strauss, consultant and financial advisor to the Rockefeller interests.

Staff includes Charles B. Stauffacher, executive secretary, and Thomas J. Craven, assistant executive secretary.

Committee is studying problems of financing production capacity in excess of current needs, as compared to procuring reserve end-products without a capacity approaching mobilization requirements. Study involves weighing the adequacy of the present government organization for maintaining reserve production equipment and facilities, and problems of operating high-capacity, low-production plants.

The advisory committee will prepare a report for ODM in the early fall with its recommendations. Meanwhile, the committee staff is collecting data from government agencies as background for the recommendations.

NAA and CIO Union Agree to Arbitrate

North American Aviation and the CIO United Automobile Workers have agreed to arbitrate their dispute over a general wage increase before a panel to be appointed by President Truman after ratification of the agreement by the union locals involved.

Workers in the Los Angeles, Fresno, Calif., and Columbus, O., plants are getting a 13-cent-an-hour cost-of-living bonus under an escalator contract. The company agreed to put 12 cents of that into the base rate, thus raising the floor from which the living-cost bonus will operate. This leaves only a one-cent living-cost bonus.

In addition, NAA offered a general wage increase of five cents an hour. The union demanded an increase of 17 cents an hour. It is this dispute over the amount of general increase which has been submitted to final arbitration.

Skyrocket Data Being Applied

Moffett Field, Calif.—Flights at more than 1,000 mph. by the rocket-powered Douglas D-558-II Skyrocket research plane (AVIATION WEEK July 16, 1951, p. 14) already have provided the U.S. aircraft industry with a new set of "fixes" which are paying off in the design of new operational military aircraft, it has been disclosed by NACA research chiefs at Ames Laboratory.

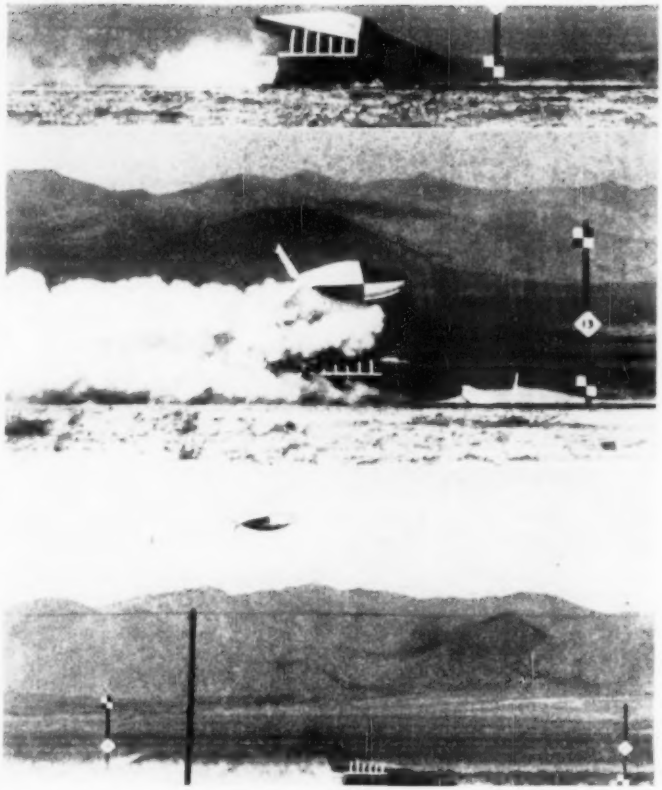
The statements are corroborated by Ed Heinemann, chief engineer at Douglas Aircraft Co.'s El Segundo division, who directed the Skyrocket's development. The D-558-II, he said, is providing new data in rolling and yaw control.

"Its oscillations were controllable at high speeds, but not good enough for combat plane characteristics," he told AVIATION WEEK. But the information obtained has been particularly valuable in providing new parameters for wings and "as a result we can now design airplanes like our F4D Skyray interceptor, A3D twin-jet bomber and the other new planes coming out with marked improvements in stability and control."

► **Other Tests**—NACA spokesman here disclosed that a modified Grumman F6F Hellcat, with variable control characteristics, has been undergoing flight tests at Ames, simulating at much lower speeds the typical roll and yaw characteristics of the Skyrocket. The problems these create are under study.

The information will be valuable not only for design of piloted aircraft but for highspeed missiles under development as well, the NACA researchers said.

Initial indications during early flights of the Skyrocket were that the plane would show critical lateral stability at low speeds; as a result additional tail fin area has been put on above the rudder.



"BAIL-OUT" COCKPIT TESTED

Fitted to a test rig simulating a fighter nose, ejectable cockpit capsule developed for Navy by Douglas Aircraft Co., El Segundo, is proven at Naval Ordnance Test Station, Invokern, Calif. This dramatic photo sequence shows test rig being propelled down a track by two successive rocket stages top), capsule leaving rig with stabilizing fins extended (center) and breaking chute open (bottom). Capsule will protect pilot at altitudes up to 50,000 ft., can float if it lands in water. Device is reported ready for use.

Subsidies Estimated At $44.5 Million

Civil Aeronautics Board has announced the subsidy rate it believes each U.S. international and territorial airline is getting out of its mail pay. The rate amounts to an estimated $44.5 million out of this year's expected total mail pay of $63 million.

The international route subsidy element of mail pay is thus about 71% of total mail pay, CAB estimates. But it is only 14% of total revenues estimated at $324 million for those airlines this year—including passenger, cargo and mail.

The CAB breakdown shows the following expected subsidy proportion of total revenues of leading international and territorial airlines: TWA 9%, Pan American, Atlantic division 14%, Latin American division 11%, Pacific division 21% and Alaska division 15%; Braniff 25%; Panagra 12%, and Northwest 16%.

The Board's study predicts that although the subsidy share of total revenues will decrease, the total dollar volume of subsidies "will tend to increase over the next several years."

Reasons:

- **Foreign competition.** The share of PanAm and TWA of the North Atlantic passenger trade, for instance, dropped from 68% in 1949 to 57% in 1951.
- **Costs** have gone up about as fast as volume in international air operations; this has not been true in U.S. domestic operations.
- **Costly routes** like those in Alaska and South Africa must be maintained and even increased for national defense reasons. Alaska, to cite one example, places almost complete reliance on air transport.

Executive Aircraft Increase Forecast

Continued heavy activity in the corporate-owned aircraft field, with this year showing increases of "from 40 to 50% over 1951 figures," was forecast by CAA Administrator C. F. Horne at recent meeting of National Association of State Aviation Officials in Brighton, Utah. Increased sales of four- and six-place planes is beginning to outstrip present production, he said, and the rise in business flying during the past three years is also showing up a shortage of pilots and mechanics.

About 80% of the nation's 50,000 private planes are being used for business purposes.

Some 50 NASAO members, however, urged CAA drop its plans for decommissioning low- and medium-frequency radio ranges. Director Harlon W. Bement of Utah Aeronautics Commission said that such a plan would "work hardships on private pilots, particularly in the mountain states."

Dutch Entry

- **Fairchild gets license to build Fokker S. 14.**
- **And it meets most USAF specs for Trainer X.**

Fairchild Engine and Airplane Corp. dropped a bombshell among competitors in USAF's Trainer X design competition when it announced acquisition of license agreement from Fokker Aircraft Corp., Amsterdam, The Netherlands under which it would build the S. 14 two-place jet trainer to fill USAF requirements for Trainer X in all categories except the weight class. And, according to most industry observers concerned, the weight specified by Air Training Command is too low to be compatible with other design requirements.

When the competition was submitted to the aircraft industry early this year, June had been set as the deadline for design competition. However, the competition had to be reissued when specifications for engine types within the USAF requirements failed to comply with the overall design specifications (AVIATION WEEK May 19, p 17).

► **In Production**—The Fokker S. 14 already is in production in Amsterdam and has completed more than 100 flight-test hours. Industry sources, further report that the trainer is on order in France, Italy, The Netherlands, in two South American nations and is under consideration for procurement in Great Britain.

Widespread popularity of the new jet trainer among the nations allied under the North Atlantic Treaty likely will provide considerable influence in favor of the S. 14 among Air Force and Navy officials concerned with the jet trainer program, military sources predict. In explanation of this prediction, it was said that of primary concern to the U. S. as well as other members of the NATO group is the need for standardization of equipment, particularly in the pilot training programs.

► **Specifications**—The S. 14, a two-place, side-by-side jet trainer is powered by a single Rolls-Royce Derwent 5 centrifugal-flow turbojet engine with a static thrust of 3,500 lb. The plane has an empty weight of 8,280 lb. and a gross weight of 11,700 lb., length is 43 ft. 8 in., span 39 ft. 5 in. and height is 15 ft. 4 in., incorporating tricycle landing gear.

Performance specifications, which for the most part are better than those hoped-for by USAF, offer a maximum cruising speed of 400 mph. at 25,000 ft. and a rate of climb at sea level (at 14,500 rpm.) of 3,300 fpm. The S. 14 can climb to 10,000 ft. in 3.5 min. and to 20,000 ft. in 8.3 min. Maximum cruising range (at 300 mph.) at 25,000 ft., including climb to altitude, is 600 mi. It can clear a 50-ft. obstacle on takeoff in 1,100 yd.

Mexico Gives EAL New Route Permit

(McGraw-Hill World News)

Mexico City—The Mexican government has granted New Orleans-Mexico City operating rights to Eastern Air Lines, which has been angling for them for years.

Direccion de Aeronautica Civil (Federal Civil Aviation Bureau) of Mexico said last week it had granted permission to EAL to operate the route, but at the same time reserved the right for a Mexican airline to fly reciprocally to New Orleans. The United States already has approved such an arrangement.

The new route has often been called the "heart" of the route between New York and Mexico, as it is most direct. In view of the fact that a record-breaking tourist business to Mexico is running more than 150,000 passengers a year from the U. S., the bureau's action is considered a "big break" for Eastern.

Two years ago this month Mexico rejected a U. S. proposal that would have allowed EAL to activate its long-dormant route from New Orleans to Mexico City (AVIATION WEEK July 24, 1950, p. 51).

Eastern had been granted the Mexico City route in the Civil Aeronautics Board's Latin American case decision four years earlier and had made preparations to activate it.

Two reasons were given in connection with Mexico's refusal. No completely Mexican line was ready to fly the Mexico City-New Orleans link, and Mexico wanted to get in at its beginning. Also, Pan American World Airways and American Airlines already operated to Mexico from Texas gateways and a competitive factor was involved.

The U. S. had suggested that Mexico grant the route to EAL in return for permission to Mexican-owned Aerovias Guest to pick up passengers at Miami on the way to Madrid. Aerovias Guest could make fuel but not traffic stops at Miami previously. Mexico contended that Aerovias Guest should be given the permission with no strings attached.

Behncke Edict Puts ALPA in Turmoil

Early last week airline pilots and management were in turmoil when former Air Line Pilots Assn. President David L. Behncke reappeared on the scene armed with a final decree issued by a Chicago U. S. District Court naming him legal president of ALPA.

The year's layoff as head of the pilot's union apparently had not damaged Behncke's old form and well-known vigor; he immediately issued declarations that all contracts negotiated under direction of ALPA's new president, Clarence Saven, were "illegal," that no pilots could negotiate with airline management without his approval, nor could they meet among themselves without his consent.

Immediate pilot reaction was just as vigorous. At press-time ALPA's directors reportedly had resigned in a body, although, when queried, one member allegedly said that was the first he knew that he had quit.

Pilots apparently were disregarding Behncke's edict against meeting. Eastern Air Lines' flyers were said to be gathering to vote on seceding from the union; PAA pilots, who reportedly have been considering a move to form a new organization for some time, were seen accelerating their decision as a result of the union founder's moves.

The major airlines admittedly were unhappy about being caught in the middle of the union battle. Some had negotiated contracts since Saven came in last July 17; others had contracts running out that had been signed while Behncke was on top, and had already begun planning of new talks with Saven.

As of early last week none would guess what might happen.

Deliveries of B-47s Reported Up 20%

Boeing B-47 bombers now are being produced in substantial numbers, Dr. John R. Steelman, Acting Defense Mobilizer, reports in the sixth quarterly Office of Defense Mobilization report which estimated total military procurement and construction programs at $8$8 million.

Steelman cited the B-47s along with the M-47 medium tanks, which he said now are being delivered at a rate of more than 300 a month. He did not disclose the current B-47 production rate.

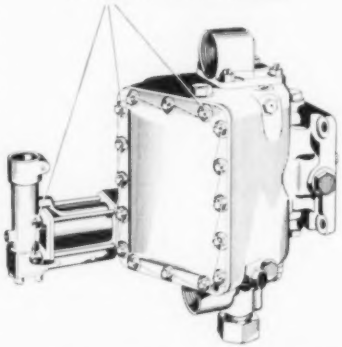
(Advertisement)

Fastener Problem of the Month

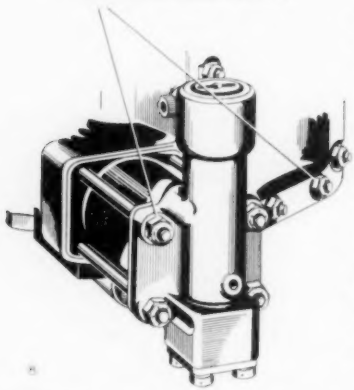
Hydraulic Equipment — July 1952

SAFETY WIRED NUTS

PROBLEM: Wiring castellated nuts on hydraulic accessories had long been a costly and time-consuming operation—yet vibration-proof fastening was essential. Engineers at Vickers Incorporated, producers of oil hydraulic equipment for American and foreign aircraft, sought a speedier, more economical fastening method which would have holding power at least equal to the original safety-wired assembly.



ELASTIC STOP NUTS



SOLUTION: Standard Elastic Stop Nuts, on locked studs, provided the vibration-proof holding needed by Vickers units. The famous red elastic collar eliminates axial play between bolt and nut threads, making Elastic Stop Nuts truly self-locking. No safety wiring or other extra locking procedures are required. Vickers reports that Elastic Stop Nuts have provided faster and thereby a more economical assembly; simpler field maintenance; greater holding power; and neater, more compact appearance for their airborne pumping units.

ESNA can probably suggest a self-locking, vibration-proof fastener that will be the best answer for *your* fastening problem. Mail our coupon for the ESNA design information that will provide the answer. Get it now—before your next fastening problem comes up.

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☐ AN-ESNA Conversion Chart
☐ Here is a drawing of our product. What fastener do you suggest?

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Firm .....
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Suppliers to Do Most AMC Maintenance

Dayton, O.—New policies on Air Force maintenance operations have resulted in establishment of a new Air Materiel Command directorate, shuffling of several general officers into new jobs at new locations.

Lt. Gen. Edwin W. Rawlings, AMC commanding general, said that much of the future maintenance work—airframes, engines and major electronic assemblies—will be done in plants of the original supplier, rather than at specialized depots scattered around the country as in the past.

Rawlings pointed out that the new policy will have three benefits, dollar-wise:

- It will abort purchases of expensive machinery and setting up training classes for personnel if the work were to be done in AF depots.
- Primary suppliers generally can be counted upon to do the work faster and more cheaply.
- It will serve to maintain forces of skilled workers in the plants of original suppliers, now facing depletion by the stretchout program.

The policy change resulted in the splitting of the former Directorate of Supply, Services and Engineering into two directorates:

- **Directorate of Maintenance Engineering,** headed by Maj. Gen. Carl A. Brandt, former assistant to Lt. Gen. Orval R. Cook, deputy Chief of Staff, Materiel, in Washington.
- **Directorate of Supply and Services,** headed by Brig. Gen. Lewis R. Parker, former chief of the Supply division.

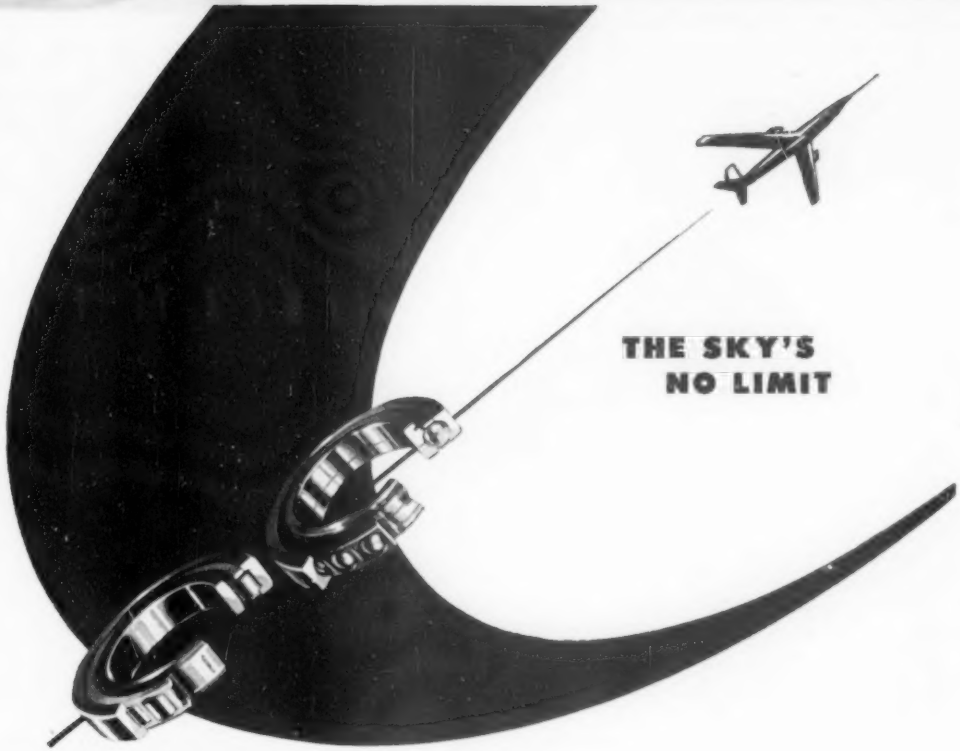
Maj. Gen. William D. Eckert, former deputy commanding general of AMC, will go to Washington to replace Gen. Brandt and Maj. Gen. George W. Mundy, former head of the dissolved directorate, will succeed Gen. Eckert. Brig. Gen. Manning E. Tillery will be temporary chief of the Engineering Directorate, pending arrival of Gen. Brandt.

Maj. Gen. Thomas H. Chapman, chief of the Maintenance Engineering division since 1950, will become commanding general of Warner Robins AFB, Macon, Ga., to replace Brig. Gen. R. V. Ignico, who is retiring.

Copters for Survey

(McGraw-Hill World News)

Bogota, Colombia—Minister of Public Works has purchased three Hiller helicopters to be used for survey and ground supply during building of a new railroad in the Magdalena Valley. The Hillers were purchased for approximately $25,000 each.



"Give me a place to stand and I'll move the earth." Archimedes meant, with a place to stand in the sky, he could pry the earth from its orbit. In Archimedes' day, the sky was the limit—but no more.

Men go farther and faster now than ever before, the sky's no limit, because progressive SKF bearing design coupled with proven manufacturing know-how assures reliable engine performance in today's rugged aircraft.

SKF intends to continue its four decades of close cooperation with the aviation industry, pioneering aviation's needs for new and improved bearing designs.

And will continue to provide every industry with eight good reasons for preferring SKF: Integrity, Craftsmanship, Metallurgy, Tolerance Control, Surface Finish, Product Uniformity, Engineering Service, Field Service. 7309

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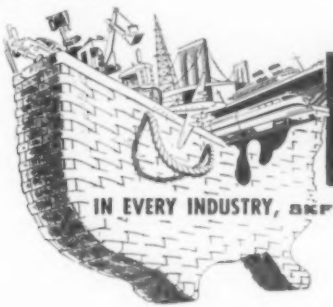
manufacturers of **SKF** *and* HESS-BRIGHT *bearings.*

Anticipating aviation's demand for advanced bearing design— SKF is adding a wing to its Philadelphia Research Laboratory that will double its research facilities.



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PIASECKI WORK-HORSE YH-21 takes the air on its first flight at the company's Morton, Pa., plant. Twin-rotor craft comes in four versions for rescue, assault transport and resupply duties, is being built both for the United States Air Force and the Army.

Work-Horse Has Easy Service Built In

- **Big copter is designed for field maintenance.**
- **Easy access to engines is a major feature.**

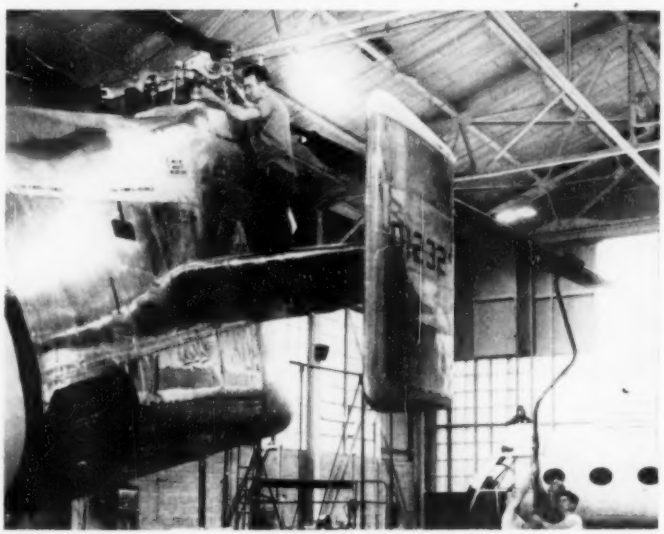
By David A. Anderton

Morton, Pa.—Grooming and feeding Piasecki's big H-21 Work-Horse should be a cinch for the Air Force and Army maintenance crews.

▶ **Simple Service**—The Work-Horse—a tandem twin-rotor copter being built in several versions for the Air Force and Army at the Piasecki factory here—was designed for field operations and maintenance. Systems servicing, engine checks and maintenance, rotor and hub overhaul all can be done without the luxuries of an overhaul depot.

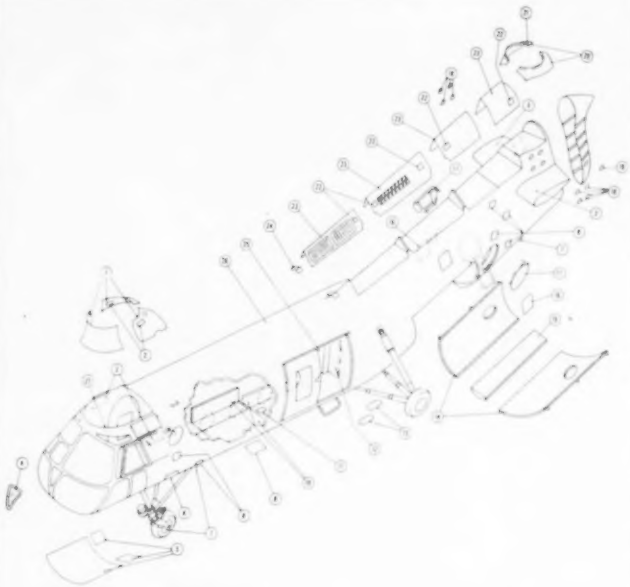
Work platforms are built into the ship, huge access doors are easily removable, and engine accessories are reached through twin air exits—which are large-diameter holes—on either side of the fuselage.

Piasecki engineers drew heavily on past experience of the firm's field service representatives with the earlier HRP series in designing the big copter. From these ships they had gripes and suggestions for improvement.



WORK PLATFORM for the rear rotor is a stub stabilizer which stays with the airplane even when the tail is removed for some missions. Handholds and footholds enable the mechanic to climb to the lofty perch. Three men in background fit the blade folding-and-securing rack preparing to move the rotor blade into the folded position.

Then Harry Pack, Piasecki's vice president for customer relations, went to Korea and studied helicopter operations of the Army, Air Rescue Service and the Marines. His interviews with pilots and service personnel were sum-



Work-Horse Accessibility

1. Forward rotor cowling is removable in three sections for access to upper portion of forward transmission and control components.
2. Access doors in aft pieces of forward rotor cowling provide simple means of checking transmission oil level and access to oil filler.
3. Work platforms are provided on each side of both forward and aft rotor hubs.
4. Removable Plexiglas section in the nose provides access to connections on back of instrument panel.
5. Removable skin panels on bottom of cockpit section give access to control components.
6. Removable panel on left side of cabin section gives access to a scupper containing hydraulic test outlets.
7. Jack-pads are provided at the nose wheel attachment point, on the structure of each of the main landing gear wheels and on the keel aft of the engine compartment.
8. Flush access steps of adequate size to accommodate Arctic Shoe-Paks and hand holes facilitate reaching work platforms and inspection doors located near top of fuselage.
9. Access panel to radio compass loop antenna installation.
10. Cabin floor panels are removable to facilitate inspection of control cables; right-hand panels are hinged along the outboard edge.
11. A removable flush access door is provided in the cabin floor to permit in-flight emergency manual operation of the auxiliary fuel system four-way valve.
12. A zippered insulation curtain provides access to a compartment containing the mid-transmission and clutch, autopilot equipment assembly, battery, aft electrical distribution box and fuel cell access panel.
13. Removable panels with air scoops on the bottom of the fuselage provide ventilation and access to the auxiliary fuel system components.
14. Two structural doors are removable for access to the engine compartment.
15. A removable section of keel serves as a work platform to facilitate powerplant maintenance and, when removed, permits removal of the powerplant as a package.
16. Removable structural doors are located on each side of the powerplant compartment for access to rocker boxes.
17. Access to engine accessories is provided through doors on engine air outlet openings on each side of the fuselage. A folding ladder is fitted to door on right side of fuselage to facilitate reaching fuel and oil scuppers and flush steps to aft work platforms.
18. Four removable panels are provided on each side for access to the aft transmission and for installation and removal of protective armor.
19. Access panel in tail fairing to magnetic compass transmitter.
20. Aft rotor cowling is removable in two sections for access to upper portion of transmission and control components.
21. Access door in the rear piece of the aft rotor cowling provides simple means of checking transmission oil level and access to oil filler.
22. Hinged access doors are provided in removable sections of turtleback to facilitate inspection of rear drive shaft, bearings and couplings.
23. A turtleback fairing is removable in four sections to provide access to rear drive shaft and control cables.
24. Removable panel provides access to cable attachment for supporting central transmission—main clutch assembly during removal.
25. Removable shields are provided to protect control cables on the right side of the cabin compartment at both forward and aft ends.
26. Cabin heater duct assembly is hinged to provide easy access to drive shaft couplings and bearings (not visible).

SOUTH BEND
13" LATHES
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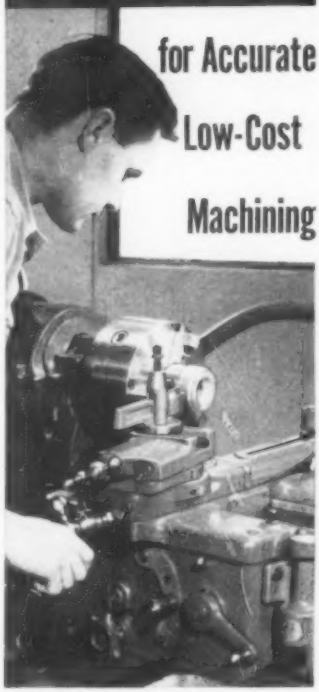

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- **Collet Capacity** — 1"
- **Spindle Speeds** — (8), 40 to 940 r.p.m.
- **Cross and Longitudinal Power Feeds** — 48 each
- **Thread Cutting** — 48 R. H. or L. H. pitches . . . 4 to 224 per inch

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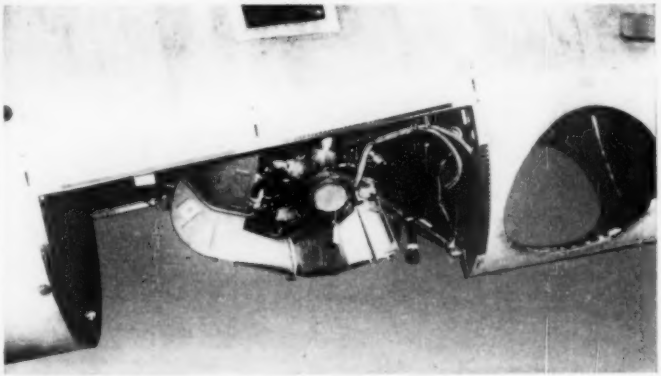
TWO STRUCTURAL DOORS come off each side of the fuselage at the powerplant section for engine access. Between the doors is a removable keel section which can also be left in place for a work platform.



ACCESS DOORS OFF, the Wright Cyclone 9HD engine is ready to be worked over. Lowering the engine can be done easily with a cable hoist.

marized in a report which underscored the importance of easing field maintenance tasks.

All this together–plus information from the military–led to the design detail of the H-21 series.

▶ **Description**–The Work-Horse is a twin-rotor copter which follows the general style set by Frank Piasecki in his Flying Banana of 1945.

The fuselage has a sharp break at about the midpoint; forward of this break is carried the cargo or passenger complement. This forward section–which slopes upward when the ship is on the ground–becomes level in forward flight.

The after section contains the engine–a Wright Cyclone 9HD (R1820-103)–and the transmission and gear box. The engine is mounted with its driveshaft horizontal and probing forward. It drives into a gear box transmission which powers two driveshafts. One goes forward and the other doubles back to drive the rear rotor.

As some indication of size, the carrying capacity of the Work-Horse is 20 fully equipped troops. This compares, of course, to the civilian DC-3 transport. Rotor diameter is about 44 ft., and gross weight in the overload condition is ". . . well over 14,000 lb. . . ."

▶ **Four Versions**–The helicopter is being built in four versions which differ in details from the basic design.

- **YH-21 and H-21A** are rescue copters, for the USAF Air Rescue Service. Engines in this model will be held to 1,150 hp.
- **H-21B** is a USAF assault craft.
- **H-21C** is an Army troop carrier and resupply job.

Both the H-21B and H-21C will use the full takeoff rating of 1,425 hp.

▶ **Fuselage Layout**–The fuselage compartment is about 20 ft. long. At the forward end is the pilot's compartment,

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Congratulations
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With an all-time record of 500 consecutive days' and 109,000 engine hours' operation without a single DC-3 engine failure, Chicago & Southern Air Lines rates a big round of praise from the aviation industry.
Singled out for special tribute are the operation, maintenance and engineering men whose job it is to "keep 'em flying."
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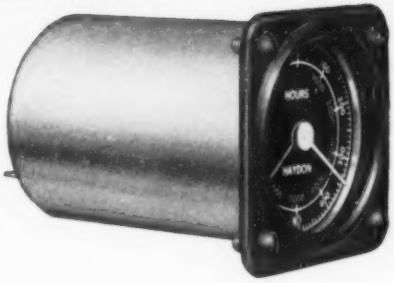

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A FUNDAMENTALLY NEW APPROACH TO THE DESIGN OF DELAY TIMERS . . . SPECIALLY DESIGNED FOR MILITARY USAGE . . . HERMETICALLY SEALED . . . READILY ADAPTABLE TO SPECIAL APPLICATIONS.

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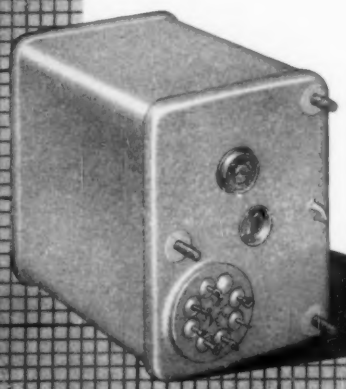


...with Advanced Timing Design

NEW HAYDON ELAPSED TIME INDICATOR OFFERS OUTSTANDING ADVANTAGES

HAYDON* introduces with considerable pride this new 7008 Series Elapsed Time Indicator which offers a major advance over previously available equipment.

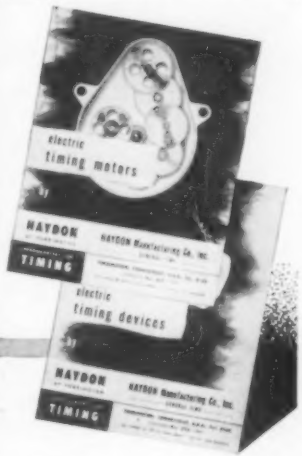
Designed specifically for 400 cycle operation in airborne equipment, the barrel diameter is only 1.525"; length 2-45/64", weight 6 oz., power consumption less than 3 watts. Indicates in units of tens of hours up to 10,000 and repeats.

This meter indicates operating time of components with specific life or servicing requirements. This unit offers the unusual advantages of small size, hermetic sealing and 400 cycle operation for such applications as electronic devices, where tubes or other components should be replaced at specified intervals. Running time indicators can prevent unnecessary servicing, insure timely maintenance that protects against failure in operation. For full particulars write for Engineering Bulletin No. 4.

NEW TIME DELAY RELAYS
for 60 and 400 cycle A.C., and D.C.

The HAYDON 5103 trigger trip Time Delay Relay is designed so that the synchronous motor performs its true function as a time standard. Switching work is accomplished by a relay coil, which, when energized, cocks the load switch for release at the end of the delay time. Hair trigger release point assures snap action. The time cycle is necessarily completed before the motor is de-energized, since an inherent safety factor is provided in control of the motor by a separate switch, which is opened only after closure of the load circuit. Reset is fast and positive, upon release of the relay, due to low friction and inertia in the single moving element. Since the controlled switch is independent of the operating circuit, various A.C. and D.C. voltages and various frequencies can be handled, both in the line circuit and in the controlled load. Engineering Bulletin No. 3 contains complete data, write for it.

HAYDON TIMING MOTORS and TIMING DEVICES



HAYDON specializes in the manufacture of timing components for standard applications and also in the design and mass production of custom-engineered timers for volume applications. The basic element of all HAYDON timers is our own rugged industrial motor.

This means that HAYDON timing devices can be depended upon to give long, quiet operation. They are small and compact and offer designers unusual latitude in that they may be mounted and will operate in any position. For military applications various motors are available either separately or in many types of timers; HAYDON engineers will be pleased to review your requirements and specifications. Write for literature you need.

HAYDON Manufacturing Company, Inc.
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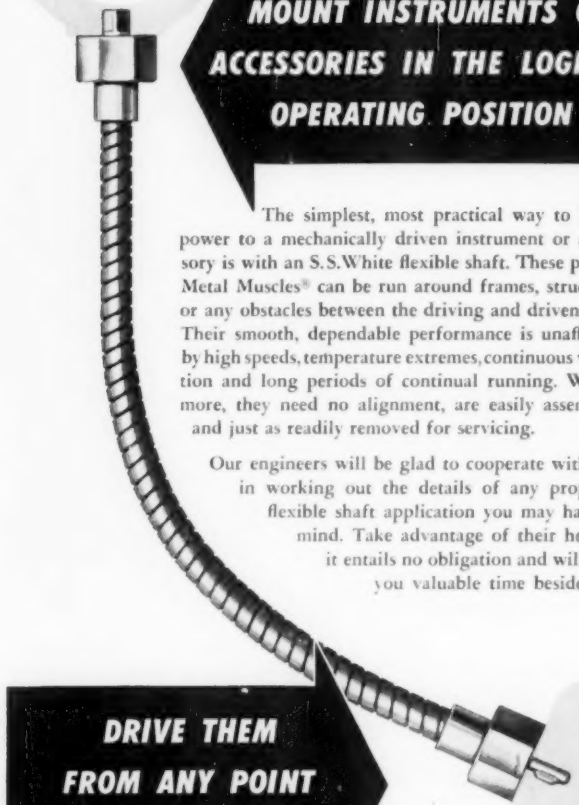

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The simplest, most practical way to bring power to a mechanically driven instrument or accessory is with an S.S.White flexible shaft. These pliable Metal Muscles® can be run around frames, structures or any obstacles between the driving and driven part. Their smooth, dependable performance is unaffected by high speeds, temperature extremes, continuous vibration and long periods of continual running. What's more, they need no alignment, are easily assembled and just as readily removed for servicing.

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separated from the rest of the fuselage by a bulkhead with a narrow access opening. From there aft, the fuselage is built with ring frames and simple angle skin stiffeners. There are three stiffeners between each pair of successive frames.

The forward rotor driveshaft extends through the inside of the fuselage just below the ceiling. It is enclosed in a light fairing to protect troops from the rotating shaft.

Floor of the ship is metal for the cargo version, with tiedown fittings and skid rails.

Twelve litters can be fitted into the rescue version, in banks of three and tandem pairs of banks on each side.

Normal seating arrangement places nine men on each side of the cabin with two across the rear. This arrangement gives a 22-in. aisle down the center. These seats are collapsible and fold against the sides of the cargo compartment.

► **Loading and Unloading**—There are two loading doors, one on the right side forward and one on the left side at the aft end of the compartment.

Above the forward door, and on the outside of the fuselage, there is a hydraulic hoist with a capacity of 400 lb. This is operated by the co-pilot and is normally used to lift litter patients.

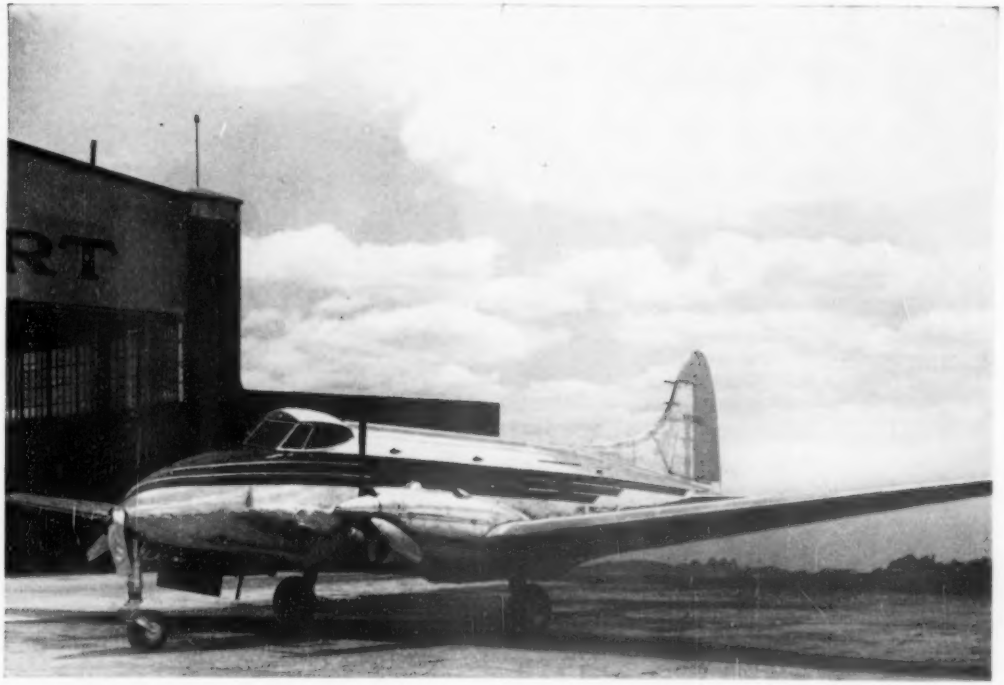
All types of Army trucks can be used for loading and unloading the Work-Horse. In the static drooped position of the blades, trucks have to be backed up without passing under the outer portions of the blade, but at the door, clearance is adequate. If the blades have to be kept turning for quick take-off, they will clear the tops of most cargo trucks.

Anything that is too big for the cargo compartment—up to the weight-lifting capacity of the ship—can be carried outside on a fuselage sling with a quick-release mechanism.

► **Maintenance**—One of the first things you notice about the H-21 is that the rotors are high off the ground; the forward one is at the 13-ft. level or thereabouts and the rear motor is a little higher. This precludes using a box or an old oil drum to stand on for working on the rotor hub. So Piasecki built into the Work-Horse two sets of work platforms for the rotors.

On the forward set, a pair of platforms hinged to the fuselage side drops down on cables to make a place to stand for the mechanic. This lofty perch is reached by hand- and footholds, big enough to take the Arctic Shoe-Pak.

The after rotors are reached from the stub stabilizer. The horizontal and vertical tail showing on the copter may be removed for some missions; a small stub of surface remains, and this serves as the work platform for the rear rotors. As in the case of the forward set, hand-



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Gordon Air Service is a franchised regional distributor of the "Dove", and has had direct working experience with the aircraft since 1948. Therefore we can guarantee that the "Dove" will deliver top performance air-mile, after air-mile, after air-mile.

A good supply of replacement parts and accessories are carried in stock, and expert maintenance service is available at Pontiac Municipal Airport; Pontiac, Michigan . . . and all well equipped airports.

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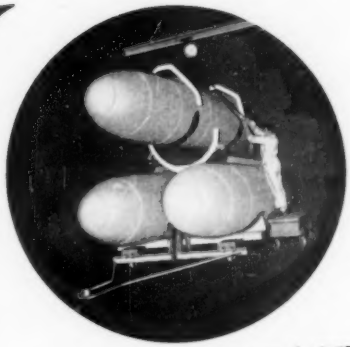

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and footholds give access to the platform.

Once on these platforms, the mechanics can remove the hub cowlings—the forward set in three pieces and the after set in two. This gives access to the upper transmission components and controls.

With an overhead hoist available, the combined transmission and rotor head can be hoisted out as a unit.

▶**Engine Access**—The powerplant on the Work-Horse is really accessible. Two removable doors and a section of removable keel open up the entire fuselage belly underneath the engine. To reach the accessories, the mechanic works through engine cooling air outlet holes—one in each side of the fuselage—which are just about at head level when the copter is in the three-point attitude.

The keel doesn't have to be removed; it can stay with the ship and then serve as a work platform. The mechanic can lie down on this—comfortable, except for one hydraulic elbow about at the midpoint—and work on the engine close above him.

Then behind the engine accessory section there is another structural member—a shelf which serves as a work platform.

Side plates have been located at the engine compartment for access to the engine side-cylinder rocker boxes.

▶**Controls and Systems**—Under the cockpit section there are removable panels which expose the main control system sector arms and cable connections. These cables, incidentally, have been run through the ship with a minimum of turns and all are parallel with the centerline of the ship. This means no compound-angle pulley brackets.

These same panels under the cockpit also give onto the electrical and hydraulic system forward connections.

All engine control components are pin-locked for setting by mechanics. This means no need for careful and time-consuming angular and linear measurements when setting the controls to their neutral positions.

The earlier HRP series had hinge points at the attachment of nose-wheel gear to fuselage. These were a source of wear and required considerable maintenance. On the H-21 the nose-wheel brace assembly is rigid.

▶**Faster Folding**—Blade folding has been improved since the HRP series. A six-man crew can fold the blades in 90 sec. and unfold them in less than 40. Special blade racks are used—these are pipes with special ends which slip over the blades. The crewman then runs the blade back to the folded position, and at that position, the pipe clamps against the side of the fuselage, securing the blade.

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● Eclipse-Pioneer, one of the world's largest producers of Gyros, has developed a series of direct reading and remote transmitting Gyros for radar stabilization, navigation, remote compass, automatic pilot, and other similar airborne applications.

Typical of these Gyros is the type 14104, a two axis, gravity erected Vertical Gyro Transmitter designed for use as a remote vertical reference where vertical stabilization is required. The instrument is essentially an electrically driven, vertical-seeking gyro with separate Autosyn* transmitter pick-offs on the pitch and bank axes. Sealed in an aluminum case, protection against environmental conditions is accomplished by means of a double "O" ring labyrinth air tight seal. Signals are brought out on sealed headers (terminal panels) and caging and uncaging is obtained thru D.C. solenoids. Provisions are incorporated within the case to reduce bank error encountered in turns. A means of sensing turns is required in order to employ this feature.

*REG. TRADE MARK OF BENDIX AVIATION CORPORATION

LOOK FOR THE PIONEER MARK OF QUALITY REG. U. S. PAT. OFF.

Specifications for Eclipse-Pioneer Gyro Type 14104

Dimensions: 6¼" diam., 6⅝" high • **Weight:** 6¾ lbs.

Operational limits: 360° in roll and pitch with controlled tumbling of the pitch axis at near 90°.

Erection device: A gravity sensitive erection system maintains the gyro in a vertical position to within ±¼° of vertical.

Caging: From any position at full rotor speed in less than 45 seconds.

Power Requirements

Gyro rotor: 115 volts, 400 cycle, 3 phase, 25 VA • **Gyro caging:** 28 volts DC, 5 amperes.

Gyro turn error compensation: 115 volts, 400 cycle, Single phase 40 MA.

Pickoff excitation: 26 volts, 400 cycle, Single phase, 0.34 watts each.

Bank and Pitch Pickoff Information

Input voltage: (Nominal rotor excitation): 26 volts, 400 cycle, Single phase.

Input current: 50 milliamperes.

Input impedance (stator open): 139 + 2516 ohms.

Stator resistance—DC (line to line): 34 ohms.

Rotor resistance—DC: 48 ohms.

Stator output—max. (line to line): 11.8 volts.

Sensitivity: 220 millivolts x degree sine of displacement angle.

Null voltage—max.: 70 millivolts.

Phase shift (rotor to stator): 4°

For detailed information, write to Dept. H

ECLIPSE-PIONEER DIVISION of Bendix AVIATION CORPORATION

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(ADVERTISEMENT)

Valve Talk

for WM. R. WHITTAKER CO., Ltd.

by Marvin Miles,
Senior Member, Aviation Writers Assn.

Douglas needed a flow divider for its huge C-124 cargo-transport, a mandatory item for the ship's parallel oil cooler system. But no such unit was in production anywhere.

Douglas engineers talked it over with Phil Terry, a Whittaker field engineer. Phil took the problem back to his home office.

Whittaker designers were dubious at first. They were valve specialists with no experience with flow dividers. Besides, they were rolling in high gear on designs for other new equipment. Engineering, production and management questioned the advisability of branching into a revolutionary new field at the possible expense of other commitments.

Field Engineering argued the case for Douglas in all departments. They were convinced Whittaker should produce a flow divider. Stressing the urgent need for development of the unit, they hammered away at the importance of the project, and gradually their persistence built interest and finally enthusiasm.

Today, four Whittaker flow dividers are going into every C-124.

The presentation of the Douglas need is typical of the Field Engineering attitude at Whittaker. The field men are more than just envoys to the customer. They're representatives of the customer — and they talk like customers.

Far different than "political" salesmen, Whittaker's field engineers know the intricacies of modern aircraft valves and the ways and means of accomplishing end results. They practically live with major plant engineers throughout the design of a new aircraft or a new power plant.

Their on-the-spot job combines study, discussion, evaluation, recommendation, testing, valve servicing and continuous liaison with the home office to assure the most efficient cooperation in meeting customer requirements.

While Whittaker's field men are expert engineers today, their predecessors were salesmen. The department, headed today by Vice-President Glenn Whitaker (no relation to President Bob Whittaker), originated as a sales division, with five sales representatives pushing some 30 off-the-shelf items.

Glenn set the pattern for Field Engineering in the slow period after VJ-Day when the sales division was disbanded and he alone carried the duties of customer service.

It was in that era that Douglas and Consolidated Vultee helped Whittaker over the postwar slump that vanquished many another small concern.

Glenn worked night and day with the two major firms, bending his entire effort to help them achieve the best in valve systems for the DC-6 and the Convair-Liner. He served, for all intents, as valve engineer and expediter for the transport projects. The result was an order to Whittaker for 70 valves on each new DC-6 and 45 on each new Convair-Liner.

Today his men are scattered across the nation, following projects from drawing board through flight test and service use, sending back a constant stream of raw requirements and desired functional characteristics for specific valve systems.

Of an average 100 valve requirements forwarded by the field engineers, some 35 per cent become Whittaker production orders. Frequently, Whittaker-originated drawings are the basis for specifications issued by prime contractors.

Field Engineering's service to the customer — and to the military services as well — is outstanding. On one recent occasion an entire Field Engineering crew spent two weeks, at Whittaker expense, tracing down nine faulty valves among 1243 installed on 50 Air Force bombers.

Another time a field engineer virtually lived with an Air Force Fighter Squadron tracking down reported malfunctions in a fighter manifold valve system, learned that disassembly for adjustment was incorrectly handled, corrected the procedure and prevented the discard of valuable units.

Whittaker service doesn't stop at the aircraft plant. It begins there. As long as Whittaker valves are in use, wherever they are used, Whittaker field engineers are available to service them.

Service TO the customer is expected as a matter of course in the Whittaker Field Engineering department, but service FOR the customer has made the operation unique.

handholes, access and inspection panels have been provided in keeping with Piasecki's aim to make the copter a field-service item.

How well the engineers and service reps have translated their ideas into metal parts and hardware remains to be seen. The H-21 is being produced now —with 60% of the parts subcontracted— in the small quantities which always mark the start of a production line. But there is a line and soon the Work-Horse will be leaving the factory doors in large numbers, bound for Air Force and Army bases the world over.

Then comes the acid test of service. And the Piasecki people are confident that the H-21 will pass that test.

Canadian Air Firm To Map Large Area

Airborne geological mapping on a grand scale will be the summer job for Canadian Aero Service, Ltd., of Ottawa.

Using high-precision airborne magnetometers, three survey crews will cover more than 55,000 sq. mi. in Saskatchewan, the Northwest Territories, Alberta and British Columbia.

The aerial mapping, which is being done for several oil companies, is expected to provide data on ground basement depths and structures which will then be further explored in specific locations by ground crews.

Flying the magnetic surveys is already under way, with monitoring stations on the watch for magnetic storms which would cause variations in the magnetic field of the earth. This monitoring, for preventing extraneous errors in the magnetic survey, was found indispensable in a 16-million acre mapping of the Peace River region carried out last year.

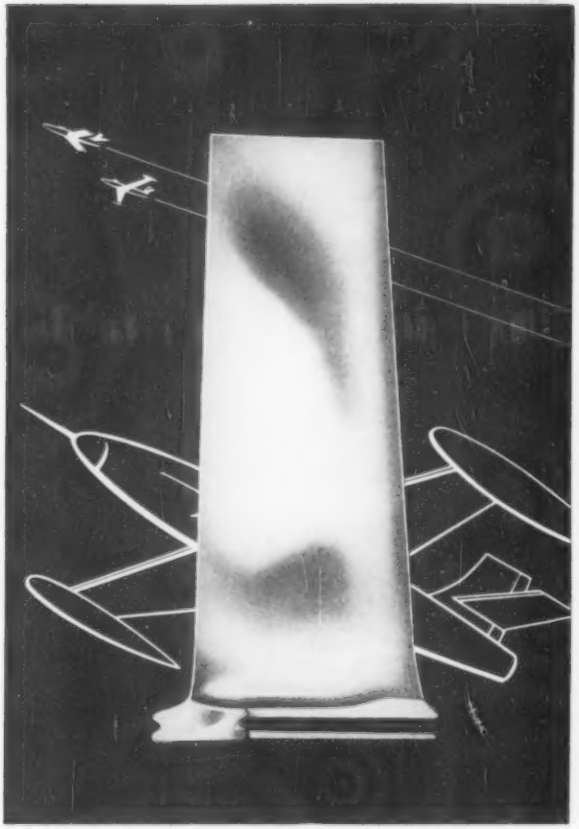
Boeing 502 Turbine In Truck Test

Boeing Airplane Co.'s Model 502 gas turbine continues to rack up running time. The experimental engine, installed in a Kenworth truck, is the first of its kind.

Latest achievement was a border-to-border run from Blaine, Wash., to Tijuana, Mexico, in less than 60 hr. This run was part of a service test program for the little powerplant. The only stops en route were for meals and fuel.

The truck has windows in both sides of the hood. Because of the small size of the gas turbine—about 13% of the volume of the regular engine—it seems at first glance as if there were no engine under the hood.

Model 502 weighs 200 lb., and puts out 175 shaft hp. It is 40 in. long, 23 in. wide and 22 in. high.



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This is not work that can be done by rote. Many of these are "first-time" processes. They require the advanced and specialized knowledge of metallurgy and metalworking for which UTICA stands.

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THRUST & DRAG

Once upon a time, as the fable goes, there was a man who owned a club. It wasn't a fancy club—just a plain ordinary hunk of tree branch which fitted his hand and had an even swing. And when the man got into a fight, he'd lay about him with the club and fracture skulls and beat ears off left and right. But in one fight a hardy opponent managed to get in a lick of his own because the man hadn't knocked him out with the first stunner. And this set the man thinking. What he needed was a guarantee that when he hit 'em, they'd stay hit.

So he strapped a couple of flat stones to the end of the club, reasoning that their hard surface would do the trick. The club weighed a little more and swung differently, but the man soon got used to it.

One day he swung particularly hard and fanned. The club flew out of his hand and some distance away and before he retrieved it, he had taken quite a beating himself. After doing in his attacker, he figured that he needed something to keep the club from doing that again. So he devised a leather wrist thong, and he was able to swing the club like crazy without ever losing grip on it.

In another grand fight, he and his opponent swung simultaneously and broke each other's clubs. After finishing off his assailant with hands, feet and teeth, the man figured he needed a stronger club. He certainly would have had the advantage if his enemy's club had broken and his hadn't.

So he built a new weapon. He found two flattish stones and a leather thong and lightly lashed them to the new club, which he had selected carefully for size, weight and swing. Then he wrapped tough animal gut over the whole works. This, he thought, is a club. It was heavier, he admitted, and it swung a little harder, but it sure was lethal.

He learned from every fight he was in. He added a pointed rock for piercing skulls and a thin serrated seashell for slashing. He lengthened the club and fattened the critical section. He also had to strengthen the wrist thong because the club was somewhat heavier by then.

One night he got into a fight; he won it with difficulty. The next day he figured a way to combine the club and a torch for night fighting.

By this time the club was really a deadly weapon. It killed on the first

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Important Cities throughout the country are now being test-warned by Chrysler Air Raid Sirens. As Sentinels for Security, Chrysler Sirens produce the loudest warning sound ever achieved for modern production. They voice a shrill warning four miles away under normal conditions.

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For complete information, specifications and availability for your City, Town or Industrial Plant write Siren Layout Service, ***Chrysler Corporation, 12200 East Jefferson Avenue, Detroit 31, Michigan.***

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PRODUCT OF MARINE & INDUSTRIAL ENGINE DIVISION OF CHRYSLER CORPORATION

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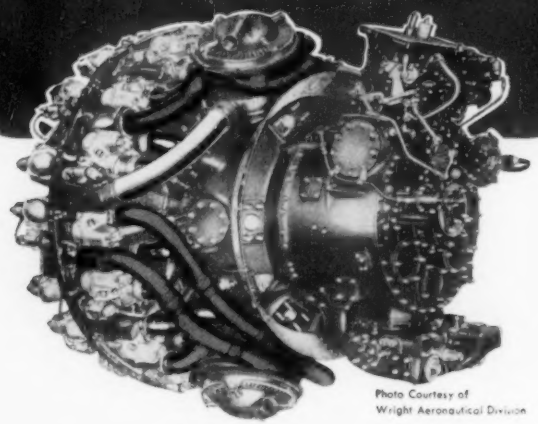

Photo Courtesy of Wright Aeronautical Division

The old saying "A chain is no stronger than its weakest link" might easily be the axiom of aircraft design. No unit of the compound reciprocating engine is more significant for its efficient service than the lowly exhaust pipe.

Smith-Morris is proud of its contribution to the success of the Wright Turbo-Cyclone "18". In the field of high temperature sheet metal fabrication Smith-Morris quality assures dependable and trouble-free service. Our experience may offer a solution to your fabrication problem.

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blow. It stayed in the man's hands. It worked equally well day or night.

The club was also a lot heavier and more unwieldly than it had been at the start, but the man realized this was the price for increased killing efficiency.

And then one day he tangled with a character from the next village. It promised to be an easy fight because the man knew he'd win as soon as he got that club swinging. But he never quite made it. Before he got that high-quality club operating, the character from the next village—using a very ordinary club picked up from under a tree—steeped in and beat the daylights out of the man.

Moral: Are combat airplanes too complicated?

AEC Releases New Patents

The Atomic Energy Commission has released 40 government owned patents for public use and listing by the Patent Office.

Some of the released inventions which might find use in avionics equipments are listed below, with the patent number and inventor shown in parentheses:

- **Thermal Flowmeter** (2,594,618; E. T. Booth, Jr.)—A high sensitivity device which measures mass flow rate.
- **Photomultiplier Tube Circuit** (2,594,703; L. F. Wouters)—Improved circuit which can operate at extremely high voltages without overloading, by using pulse techniques. This provides added amplification in the phototube.
- **Photomultiplier Coincidence Circuit** (2,595,552; R. E. Thomas)—For use with scintillating crystal detectors. Circuit uses two light sources to provide single output voltage when excitation occurs substantially simultaneously at each tube.
- **Vibration Measuring Device** (2,596,529;-530;-531; H. F. Clarke)—Three inventions which use microwaves to measure vibration when there can be no physical contact between vibrating body and measuring device.
- **Electronic Relay Circuit** (2,596,956; L. G. Nierman)—Improved direct voltage actuated electronic relay circuit which is highly sensitive yet simple, stable, and reliable.
- **Pulse Type Transformer** (2,599,182; Q. A. Kerns)—Improved method of winding a low leakage reactance pulse transformer having compositely wound primary and secondary. Transformer passes voltage pulses with little or no distortion at any desired ratio of transformation.
- **High Voltage Multiple-Core Transformer** (2,600,057; Q. A. Kerns)—A multiple-core transformer having low stray capacitance and low leakage reactance; capable of withstanding very high voltage pulses of short duration.
- **D.C. to A.C. Signal Converter** (2,600,172; E. E. St. John)—Modulator circuit which provides a.c. output signal proportional in magnitude and corresponding in phase to difference between two d.c. signal inputs.

The AEC will grant non-exclusive, royalty-free licenses on any of the 40 patents. Applicants may apply to the Chief's Patent Branch, Office of the General Counsel, AEC, Washington 25, D. C. Copies of the patents may be obtained from the U. S. Patent Office.

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Heavy Press Program Takes a Big Step

- **Kaiser casts huge 75S aluminum alloy ingot.**
- **Mammoth machines will feed on such castings.**

One of the high hurdles in the USAF's heavy forge press program has been removed. A huge-diameter aluminum alloy ingot has been successfully cast by Kaiser Aluminum & Chemical Corp.

Lt. Gen. E. W. Rawlings, commanding general of the Air Materiel Command, sees this development as a very important stride closer to the goal of cheaper, mass-production of modern air power.

▶ **Big Billets Needed**—Limitation on the heavy press program has been the comparatively small size and number of the forge units now available. But the program has been given the needle and 17 new monsters—eight forge presses and nine extrusion presses—are on the way (AVIATION WEEK July 7, p. 38).

Rawlings says that full realization of the great promise of the presses depends upon having the necessary metallurgically sound, out-sized ingots to feed into them. That's where Kaiser Aluminum comes into the picture with its large-diameter billet achievement.

Details of the process, developed by the company's division of metallurgical research, Spokane, were revealed recently during an inspection tour by Rawlings, other Air Force officers and government officials.

▶ **Troubles**—Back in August, 1951, Kaiser Aluminum was advised by the Air Force of the urgency for intensive research to develop a process for casting high-strength aluminum alloys, particularly 75S, in sizes as large as 32 in. in diameter.

Existing methods with which the company was familiar limited maximum commercial ingot size for 75S to about 12 in. in diameter. Paul P. Zeigler, Kaiser Aluminum's director of research, reports that previous attempts by a number of investigators to cast significantly larger sizes led to cracked or ruptured ingots or to inferior metallurgical quality if the ingots did not crack.

The 75S material—highest strength aluminum base alloy in commercial use in the U. S. today—is widely used in aircraft construction. Because of its high strength it is being pushed as a forging alloy in the heavy press program. Zeigler says that, as is often the case, the advantages have to be paid for: pitted against superior strength are the disadvantages of greater difficulties involved in fabrication and general metal working.

LARGEST INGOT EVER CAST for Air Force's $389-million heavy press program is inspected by Gordon Reed, special assistant to USAF Chief of Staff, Gen. Vandenberg; Lt. Gen. E. W. Rawlings, commanding general of Air Materiel Command; and D. A. Rhoades, vice president and general manager, Kaiser Aluminum and Chemical Corp.

Of all the aluminum base alloys, he says, 75S is the most difficult wrought aluminum alloy to cast into large forging ingots of the type required by the Air Force.

▶ **Degassing, Chilling**—Optimum forging quality in the 75S-type alloys requires very rapid chilling and freezing of clean and well-degassed molten metal, Zeigler says. He reports, however, that the more massive the cross-sectional area the more difficult becomes the problem of avoiding splitting and rupturing when the ingots are chilled rapidly enough to secure acceptable metallurgical quality.

Massive cross-sections, he says, also complicate the attainment of satisfactory ingot quality, because the larger they become the less the gas content that can be tolerated in the molten metal prior to freezing.

Degassing and freezing techniques were found that would permit attainment of bettter quality in the 32-in. diameter ingots than had previously been secured in the 12 in. diameter units.

▶ **High-Quality Results**—Inspection of the etched transverse slabs displayed at the inspection, Zeigler said, would reveal almost ideal metal quality, with microscopic examination showing optimum structures.

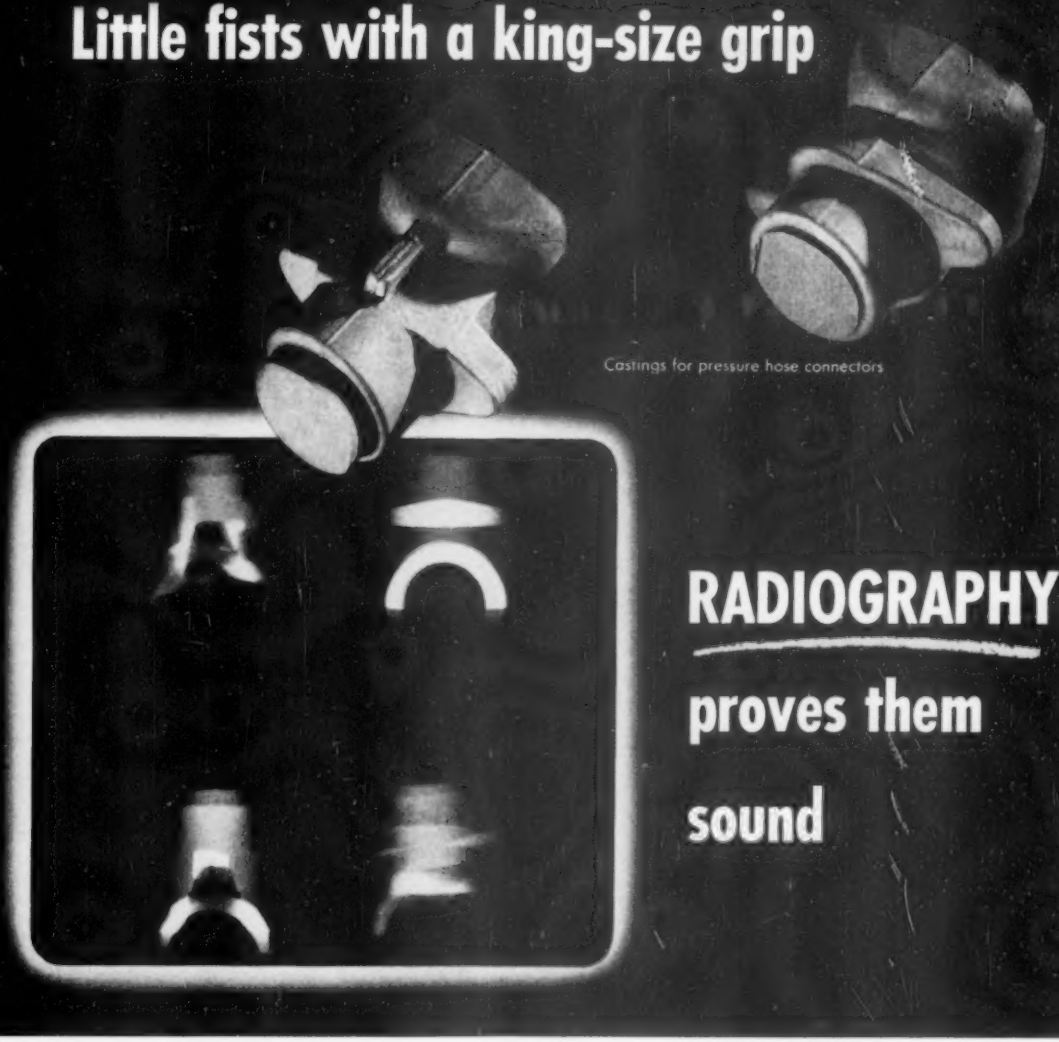
Forged pieces originally cut from the centers of 32-in. ingots were upset at 850F without benefit of a preliminary high-temperature homogenizing treatment. The cleaning and freezing techniques permitted continuous or semi-continuous operations similar to those in common use.

▶ **Quick Job**—Kaiser Aluminum started work on the design of the experimental casting unit immediately after it was notified by the Air Force. Three months later—in November, 1951—the equipment was installed.

The company's approach to the problem of casting ingots with massive square and round cross-sections was first tested on an 18 × 18-in. size. Crack- and rupture-free ingots in 75S were obtained a month after the equipment was installed.

Shortly thereafter, some 25,000 lb.

Little fists with a king-size grip



Castings for pressure hose connectors

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of high quality 18 × 18-in. ingots in 75S were cast. In a little more than three months, the first crack-free, rapidly chilled 32-in.-diameter 75S ingot was cast. This contained porosity because equipment failure precluded any degassing and cleaning operations, but success of the process was evident nevertheless.

► **Larger Castings Seen**—Since this crack-free casting was attained, company researchers have successfully cast an additional 50,000 lb. of 18 × 18-in. and eighteen 32-in.-diameter round ingots in 75S.

By June of this year, says Zeigler, sufficient metallurgical examinations were completed to convince the company that more than adequate quality can be obtained in ingots as large as the 32-in.-diameter size. He says that present equipment size limitations prevent the establishment of maximum diameter ingot size the company's process is capable of producing in 75S. But he reports there's every reason to believe that ingots larger than the 32-in. unit are possible, should the Air Force require them.

► **Production Designs**—The casting unit displayed was a relatively flexible, experimental setup rather than a streamlined production unit. Zeigler says that with the basic information obtained from the operation of the experimental unit, design of production equipment is a relatively simple matter. The company is now collecting operating data for the refinement of production designs in anticipation of the heavy press program requirements.

The presses assigned to Kaiser Aluminum are not scheduled for production before October, 1953, but the company plans to develop production designs early enough to meet requirements of other press operators who may be scheduled for production earlier the same year.

► **Press Potential**—Under the heavy press program, Kaiser Aluminum will operate four of the giant presses—25,000- and 50,000-ton forge presses and two 8,000-ton extrusion presses. The forge presses, being built by E. W. Bliss Co., Canton, Ohio, will be located in Kaiser Aluminum's Newark, Ohio, rod, bar and wire plant, and will produce a minimum of 3 million pounds of mammoth forgings per month, the company says. The 35,000-ton unit will be capable of forging a wing spar 35 ft. long, 6 in. wide, it is reported.

The extrusion presses will be located at Kaiser Aluminum's Halethorpe, Md., plant and are being built by Loewy Construction Co., New York. These units, 230 ft. long, will turn out 3 million pounds of extruded aircraft parts per month, Kaiser reports. Aluminum extrusions up to 100 ft. long

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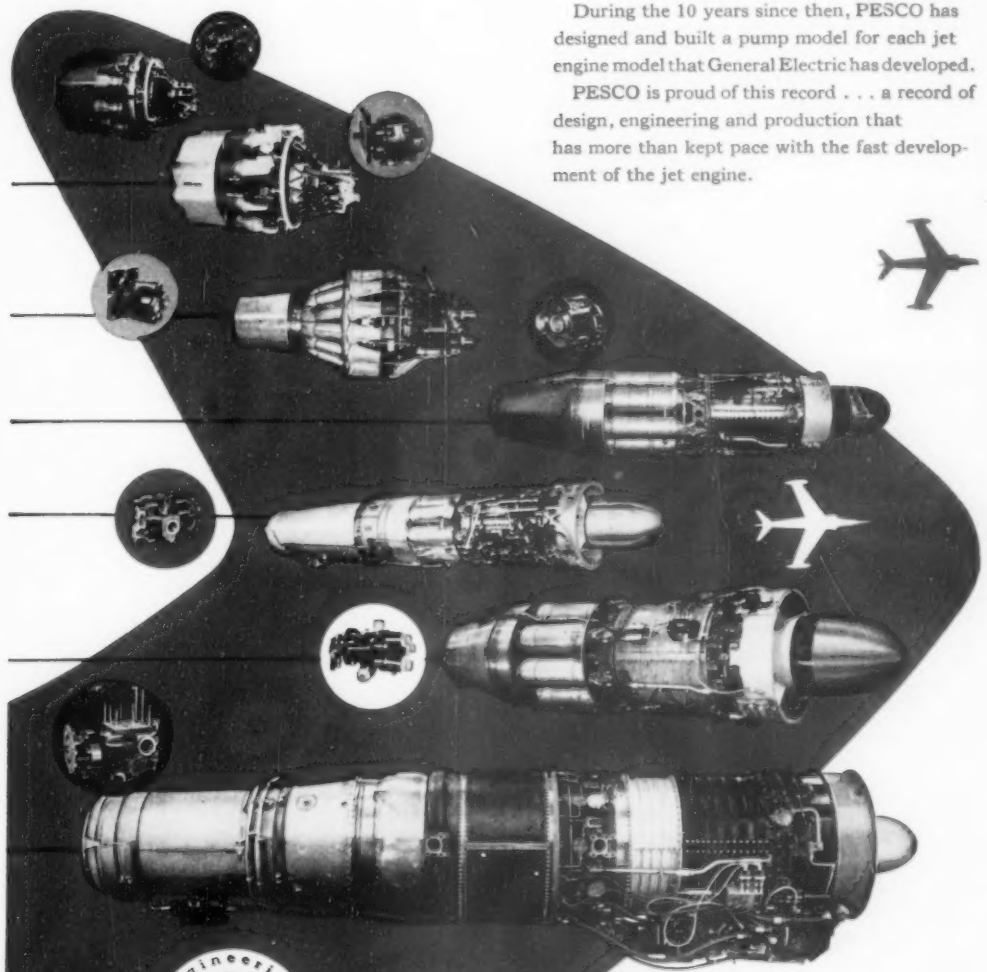

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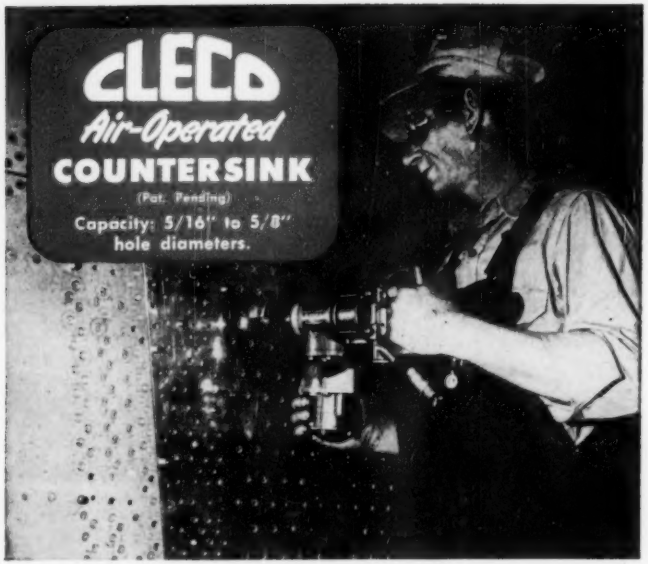

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and more than 2 ft. wide will be possible.

One example given by the Air Materiel Command of the savings effected by the forging process mentions that before heavy presses were resorted to, one airplane required some 30,000 milling machine hours. Relatively short production runs to date on an 18,000-ton press (Wyman-Gordon operated, at North Grafton, Mass.) have proved that savings up to 50% have been effected by forging. —IS

PRODUCTION BRIEFING

▶ **Abrams Instrument Corp.**, Lansing, Mich., has received $1.2 million contract from BuOrd for fire control equipment. The firm makes numerous camera and automatic timing gear for the services.

▶ **Aircraft Supplies, Inc.**, Nutley, N. J., has taken over assets and liabilities of J. P. Kurtz & Co., Alexandria, Va.

▶ **Cessna Aircraft Co.**, Wichita, has received two additional subcontracts from Lockheed Aircraft Corp. for T-33 and F-94C work, bringing its backlog on these orders alone to some $6.5 million and extending their production to March, 1954.

▶ **Douglas Aircraft Co.**, El Segundo, Calif., has the former Alcoa aluminum plant, Torrance, Calif., in production on combat plane operations. Designated B-6 Location, the 1.3 million sq. ft. facility employs approximately 800 working on Skyraider fuselages.

▶ **W. M. Hicks**, Long Island City, N. Y., has been appointed representative on the East Coast north of Washington, D. C., for Meletron Corp., Los Angeles, pressure switch maker.

▶ **Lockheed Aircraft Service, Inc.**, Burbank, Calif., has been awarded a contract for approximately $700,000 by Sacramento Air Materiel Area for repair of jet fighter flaps, ailerons etc.

▶ **Vibradamp Corp.**, Burbank, Calif., has organized Aero-Coustic division in the same city to engineer, design and fabricate specialized thermal and acoustical insulation materials for aircraft and other applications.

▶ **Westinghouse Electric Corp.**, Los Angeles, is scheduled to deliver $2 million worth of ground-to-air and ground-to-ground radio transmitters to USAF this month. The transmitters are designed for ranges up to 7,000 mi.

Certificates Of Necessity

Accelerated tax amortization for manufacturers expanding their defense facilities is granted by the government in the form of certificates of necessity.

In the following list of recent certificates, company name is given, followed by product or service, cost of construction deemed necessary for defense expansion but of little likely civilian use after the expansion, and the percentage of the expansion cost allowed for fast write-off. Fast write-off permits property to be depreciated in five years.

- **Wyman-Gordon Co.**, Worcester, Mass., aircraft parts, $1,191,625, 65%.
- **Fuller Brush Co.**, Hartford, Conn., aircraft accessories, $124,632, 80%.
- **American Bosch Corp.**, Springfield, Mass., aircraft parts, $381,110, 65%.
- **Raytheon Mfg. Co.**, Newton, Mass., electronic tubes, $350,000, 65%.
- **Bard-Parker Co., Inc.**, Danbury, Conn., aircraft parts, $42,873, 80%.
- **Lumoar Manufacturing Corp.**, New Haven, Conn., aircraft parts, $11,777, 65%.
- **Caval Tool and Machine Co.**, Newington, Conn., aircraft parts, $29,029, 70%.
- **Auburn Spark Plug Co.**, Auburn, N. Y., aircraft parts, $7,871, 80%.
- **Bell Aircraft Corp.**, Wheatfield, N. Y., aircraft parts, $153,656, 65%.
- **Curtiss-Wright Corp.**, Buffalo, aircraft parts, $3,178,080, 65%.
- **Lundy Manufacturing Corp.**, Long Island City, aircraft parts, $12,293, 80%.
- **Raybestos-Manhattan Inc.**, Passaic, wire braided hose for aircraft, $40,000, 65%.
- **Theodore J. Menton**, Baldwin, N. Y., aircraft tools, $34,185, 70%.
- **United States Rubber Co.**, Passaic, wire braided hose for aircraft, $223,198, 65%; $1,326,436, 25%.
- **Schweitzer Aircraft Corp.**, Big Flats, N. Y., helicopter assemblies, $86,848, 65%.
- **General Bronze Corp.**, Garden City, N. Y., aircraft parts, $99,811, 70%.
- **Orenduff and Rappel, Inc.**, Mineola, L. I., N. Y., aircraft parts, $32,853, 70%.
- **American Insulator Corp.**, New Freedom, Pa., aircraft parts, $24,004, 50%.
- **Electric Hose and Rubber Co.**, Wilmington, wire hose braided for aircraft, $366,000, 65%.
- **American Non-Gran Bronze Co.**, Berwyn, Pa., aircraft engine valve guides, $40,016, 70%.
- **W. J. Hunt Mfg. Co.**, Baltimore, aircraft parts, $9,278, 80%.
- **Lamson and Sessions Co.**, Birmingham, aircraft parts, $109,000, 50%; Cleveland, aircraft parts, $55,625, 50%; Kent, Ohio, aircraft parts, $64,875, 50%.
- **B. F. Goodrich, Akron**, wire braided hose for aircraft, $105,988, 65%.
- **Goodyear Tire and Rubber Co.**, Akron, wire braided hose for aircraft, $196,000, 65%; airships and parts, $508,305, 65%.
- **Holley Carburetor Co.**, Van Dyke, Mich., aircraft parts, $339,700, 65%.
- **Metalco, Inc.**, Sheboygan, Mich., aircraft parts, $5,713, 65%.
- **Vinco Corp.**, Detroit, aircraft parts, $14,810, 65%.
- **Majestic Machine and Tool Co.**, Dearborn, aircraft engine parts, $33,518, 65%.
- **Thermoid Co.**, Huntington, Ind., wire braided hose for aircraft, $1,132,400, 40%.
- **National Gear Corp.**, Indianapolis, gears for aircraft and ordnance items, $19,125, 80%.
- **Aluminum Co. of America**, Lafayette, Ind., aluminum extruded sections for aircraft, $915,000, 65%.
- **Ladish Co.**, Cudahy, Wis., aircraft parts, $5,937,300, 65%.
- **Rockwell Register Corp.**, Bellefontaine, Ohio, aircraft parts, $555,000, 65%.
- **Monument Engineering Co., Inc.**, Indianapolis, aircraft parts, $8,922, 75%.

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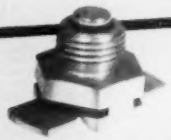

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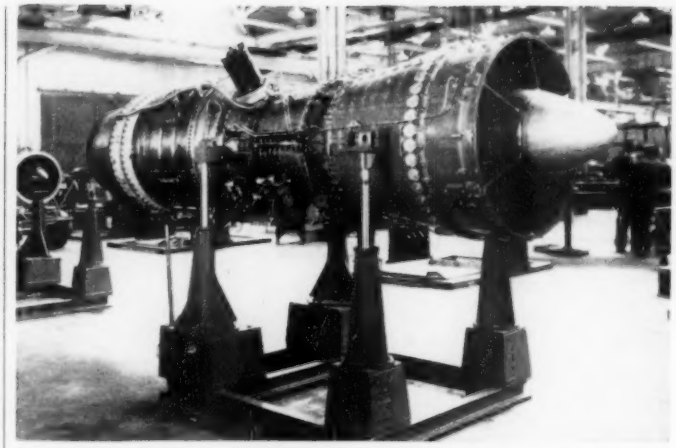

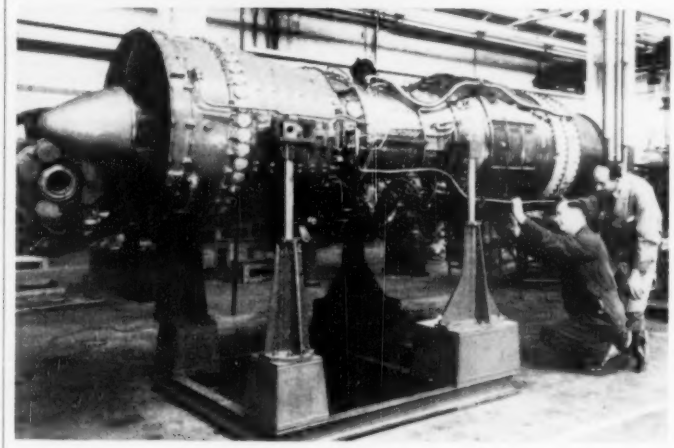

A Close Look at Bristol Olympus

These first views of Bristol Aeroplane Co.'s Olympus show the general configuration of Britain's latest entry in the high-thrust jet field. Published rating is 9,750 lb., but reports are that the latest version, cleared for flight, will deliver better than 10,000 lb. thrust (AVIATION WEEK July 17, p. 17).

The engine incorporates a two-spool compressor, the forward one a low-pressure unit and the aft one a high-pressure unit, connected through concentric shafts to the second- and first-stage turbine wheels, respectively. Engine diameter is 40 in., weight is 3,520 lb. Specific fuel consumption is tagged at .766 lb./lb. thrust/hr.

▶ **Makeup Estimates**—Stretching 124 in. from intake flange to exhaust flange, the various sections of the engine scale approximately:

• **25.5 in. for the low-stage** compressor. The stepped configuration on the casing indicates that this compressor section encompasses five stages.

• **17 in. for high-compression** stage. Here the casing indicates that seven stages are involved.

• **8.5 in. for diffuser.**

• **23.5 in. for combustion section**—either an annular or cannular type.

• **4.25 in. for the first-stage** turbine and 5.3 in. for the second-stage wheel.

Report is that there is no connection between the two compressor sections, but between each compressor and its turbine there is a flexible coupling.

Just aft of the intake casing, is a band of disks installed to permit ground adjustment of intake guide vanes. Judging from the length of the struts between intake casing and nose bullet, the first compressor stage employs unusually large blading in the initial rows.

▶ **Good Fitting**—Taper of the compressor sections is such that accessories

are fairly well accommodated within the 40-in. diameter of the engine. Transition piece between low- and high-pressure stages carries drive pads for accessories. On the bottom half of the high-pressure casing, the engine's fuel system units are located.

What appears to be a starter is mounted just aft of the high-stage compressor. Lines from the last stage of the low-pressure compressor and second stage of the high-pressure unit appear to carry air aft to the turbine section—apparently for the purpose of bearing cooling.

Mounting trunnions are located on the casing at about the second stage of forward compressor and at the rear of the diffuser section.

▶**Claims**—Bristol says: "Information available shows that in no other country today is there so powerful or so economical an engine in a comparable stage of development."

British Information Services—an agency of the British Government—reports that "the new jet is 15% more efficient than any other engine currently in production."

▶**J-57 Comparison**—These statements probably are open to dispute. Though it has never been announced officially, Pratt & Whitney's J-57 is generally known to be a two-spool configuration, hence can be considered a development which is broadly similar to the Olympus powerplant.

More than a year ago, P&W said that the J-57 was demonstrating performance characteristics, particularly with reference to fuel economy, superior to those of any other jet turbine engine known to be in a corresponding forward stage of development. Reports are that the production J-57's sfc. is well below the guarantee and chances are that it is equal to, or better than, the figure for the Olympus.

Thrust figure for the J-57, though it has never been given by the Air Force or P&W, is probably right up there with the Olympus, according to industry "guesses."

▶**"Development Status"**—Stage of development is one of those intangibles that can only be resolved with complete information. However, Bristol has just had the Olympus cleared for flight—it will fly in the English Electric Canberra this summer. P&W, on the other hand, now has 17 of the J-57s flying—one in an aerial test bed, eight in the Boeing B-52 heavyweight bomber and eight in the Convair YB-60.

The J-57, reportedly, isn't tagged for bomber power only. It's said that the jet is slated for a number of fighter types now on the boards, as well. Word is that the Navy, too, is dickering to get production on the engine. This would indicate that its "stage of development" is pretty good.

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CAB Report on Fatal United DC-3 Crash

(Editor's Note: An official summary of the crash Dec. 4, 1951, of a United Air Lines DC-3 training plane near Denver, has been released by Civil Aeronautics Board. Pertinent parts of the summary are included in the following.)

United Air Lines, Inc., near Denver, Colo., Dec. 4, 1951

THE ACCIDENT

At approximately 0725 MST[1] on Dec. 4, 1951, a United Air Lines DC-3A N-17109, designated as United Trainer 16, crashed 8.4 miles northeast of Stapleton Air Field, Denver, Colo., while on a training flight. The accident was fatal to the three occupants—a flight instructor and two first officer trainees. The aircraft was demolished by impact.

HISTORY OF THE FLIGHT

United Air Lines operates a Flight Training Center at Denver, Colorado, to train applicants for first officer positions with the company. The crew of United Trainer 16 consisted of Senior First Officer Jordan D. Kocher, who had been designated by United Air Lines as captain and instructor, and Trainee First Officers Laurence G. Wilson and Wayne C. Moen.

The flight departed Stapleton Air Field at 0655, Dec. 4, 1951. The 0628 weather conditions, upon which the crew had been briefed, were: ceiling measured 15,000 feet, visibility 25 miles, and wind northwest 14 knots. Ceiling and visibility were unlimited at the time of the accident, with the wind northwest 16 knots. No radio contacts were made by United Trainer 16 after reporting departure time. It was cleared for a training flight of four hours' duration within a 25-mile radius of Denver. Captain Kocher occupied the left pilot's seat at takeoff. Upon departure, the aircraft load, in addition to the crew, was 820 gallons of gasoline, full oil tanks, and 650 pounds of sand ballast tied down in the rear baggage pit. The load was properly distributed with relation to the aircraft's center of gravity, and the 22,910-pound gross weight at take-off was within allowable limits. Witnesses reported that at between 0720 and 0725 the aircraft was seen to stall, enter a spin, and strike the ground in a diving attitude before recovery was effected.

INVESTIGATION

Trainees Wilson and Moen had progressed to the final stages of the flight curriculum and the flight was made for the purpose of a general review of items taught at the Denver Training Center. Witnesses reported that when the aircraft was first observed, it was proceeding in a northwesterly direction. They heard one or more bursts of power, which were accompanied by a black puff of smoke from each engine. The aircraft then stalled and entered a spin, making two or more revolutions before diving into the ground. One of the eyewitnesses stated that the aircraft struck the ground while diving at an angle of about 60 degrees below the horizontal with the wings almost level.

Witness estimates concerning the altitude of the aircraft at the time it entered the spin varied from 500 to 3,000 feet. Because of this wide variance, United Air Lines conducted tests using an aircraft of the same type with four of the eyewitnesses located in the same ground positions they had occupied on the day of the crash. Communications trucks were used for ground-to-air contact. Each phase of the test flight was discussed by ground observers and the pilots involved to obtain as accurate an estimate of the simulated flight path as possible. From this reconstruction of the last few moments of flight it appears that the altitude of the aircraft was approximately 8,200 feet above mean sea level, or 3,200 feet above the terrain. Prior to entering the spin it appears that considerable altitude, perhaps as much as 800 feet, was lost after power had been applied and before the aircraft entered the spin.

All ground observers to the test flight (including CAA and company personnel) had difficulty determining whether or not the gear was down, and it was impossible to determine flap position. During several of the passes over the area, the landing gear was extended, one-quarter flaps was applied, and speed gradually reduced to 95 mph, at which point a power application was made. Full power application at 2,700 rpm. was necessary to simulate the sound heard by the witnesses.

Distribution of the wreckage was limited to a relatively small area, indicating that the aircraft struck the ground in a steep dive. The fuselage forward of a point four feet behind the main cabin door was completely demolished. Aft of this point, it was severely distorted and crushed. It was found that at impact, landing gear was extended and flaps were one-half down. All control systems were thoroughly checked but there was no evidence of malfunction or failure prior to impact.

Due to the severity of impact and complete destruction of the cockpit, positions of the various controls could not be considered indicative of their positions prior to impact. The throttles were found advanced one inch, propeller controls in full low pitch position, right and left ignition switches were on "both" magnetos, and the master ignition switch was on. The left mixture control was found in the auto lean position, the right in emergency rich and broken off. Both the left and right fuel selector valves were found on their respective auxiliary tanks. The wing flap and landing gear selector valves were in the neutral position. Trim tab settings were normal, with the elevator indicating one degree nose up, aileron neutral, and rudder one degree nose right.

Radio equipment was severely damaged. It was determined that the high frequency transceiver was set on Channel 8, 3322.5 kilocycles; the VHF transceiver was set on Channel 8, or 126.7 megacycles. A barograph was installed in N-17109 but no information could be obtained from the film which was exposed when the unit was broken by impact. Examination of the electrical system revealed no evidence of overheating or fire.

The bodies of the three pilots were thrown forward along the path of the wreckage, and their positions as they came to rest indicated that Captain Kocher was occupying the left seat, Trainee First Officer Moen was in the right seat, and Trainee First Officer Wilson was in the jump seat.

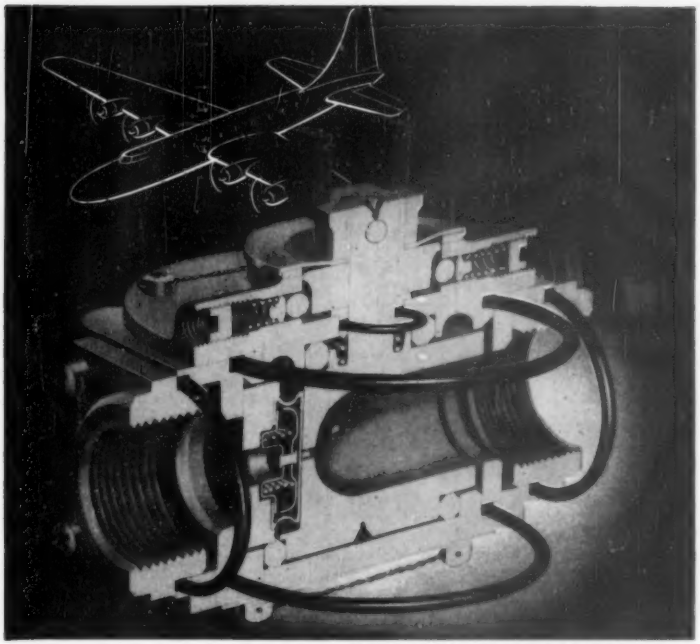
The left and right propellers were set at a position five degrees above the low pitch stops. There was no evidence found of excessive heat or internal part failure in either engine, and both were developing power at impact.

Examination of the airframe failed to reveal any indication of malfunctioning or failure of any component. Maintenance records were thoroughly reviewed and no discrepancies were noted. The aircraft was properly certificated and requirements of all applicable CAA airworthiness directives had been accomplished.

Testimony of other trainees at the Denver Training Center reflected that it was uniform practice for the instructor to occupy the left seat with the two trainees occupying the right seat and the jump seat. It was also a general flight practice at the Center for the blind flying hood to be installed on the right side cockpit windows during all maneuvers. Due to the severity of impact it could not definitely be determined whether the hood was in place. The hood in use at the time of this accident was a canvas type, secured in place by snap fasteners; this type is readily removable in the event of any emergency.

The training curriculum includes practice in approaches to a stalled condition but an aircraft is never allowed to be stalled. The aircraft is slowed in level flight with reduced power until an approach to a stalled condition is indicated. All maneuvers of this nature were, at the time of the accident, to be performed between 8,000 and 9,000 feet MSL. Entry altitude was to be 9,000 feet MSL. These altitude stipulations were in conformance with a mutual agreement among all operators in the Denver area

[1] All times referred to herein are Mountain Standard and based on the 24-hour clock.



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utilizing the practice area for instrument flight training.

Prior to the accident, ground instruction was not given to trainees in spin recovery on DC-3 type aircraft. No flight instruction in spins can be given in the DC-3, since it is placarded against intentional spins. Investigation showed that the crew members of United Trainer 16 had acquired knowledge of standard spin recovery techniques in their previous training and experience.

Subsequent to the accident, students at the Center have received ground instruction on the spin characteristics and spin recovery techniques applicable to the DC-3 aircraft. This addition to the curriculum has also been included in the courses for transition training on Douglas DC-4s, DC-6s and the Convair.

During the investigation and public hearing, information was developed relative to the stall and spin characteristics of the DC-3. United Air Lines, in cooperation with the National Advisory Committee for Aeronautics had previously conducted a series of flight tests on the stall characteristics of the DC-3 aircraft. They were found to be normal, with ample warning of the approaching stall being given before control is lost. Stall warning was more pronounced with the flaps down and the landing gear extended. With flaps and gear up the stall was more abrupt, with less warning, and there was a tendency for the aircraft to fall off on one wing.

In 1944 the National Advisory Committee for Aeronautics released a report on "Free Spinning—Wind Tunnel Tests of the Douglas DC-3 Airplane." No actual spin tests on the DC-3 have been conducted by the manufacturer or the NACA; however, this report reflects that the chief pilot for an airline company had performed four intentional spins with the DC-3. Three spins were made with landing gear up and one gear down. The aircraft weight was 22,000 pounds. One two-turn spin was made with the engines developing 450 horsepower. The longest of the spins was three turns. It was noted that considerable force was necessary to hold the ailerons in the neutral position and there was very marked buffeting of the tail surfaces. The nose was well down in the spins, being not more than 15 degrees from the vertical. Recovery was normal, with rotation stopped in less than one-half turn. The maximum indicated air speed in the spins was 150 miles per hour, with 200 miles per hour being attained upon recovery. In making a three-turn spin, 3,000 feet of altitude was lost between spin entry and final recovery to level flight.

The NACA report further reflects that in an inadvertent one-turn spin and recovery from the ensuing dive, one pilot reported that 3,000 feet altitude was lost. There have been other reports of intentional spin tests in the DC-3, the data being somewhat meager; however, they reflect essentially the same information.

The following data were obtained from wind tunnel studies made by the NACA, using a DC-3 model and analyzing the aircraft's aerodynamic characteristics: While the tests gave evidence that spin recovery is normal, an altitude loss of approximately 3,000 feet can be expected prior to a full

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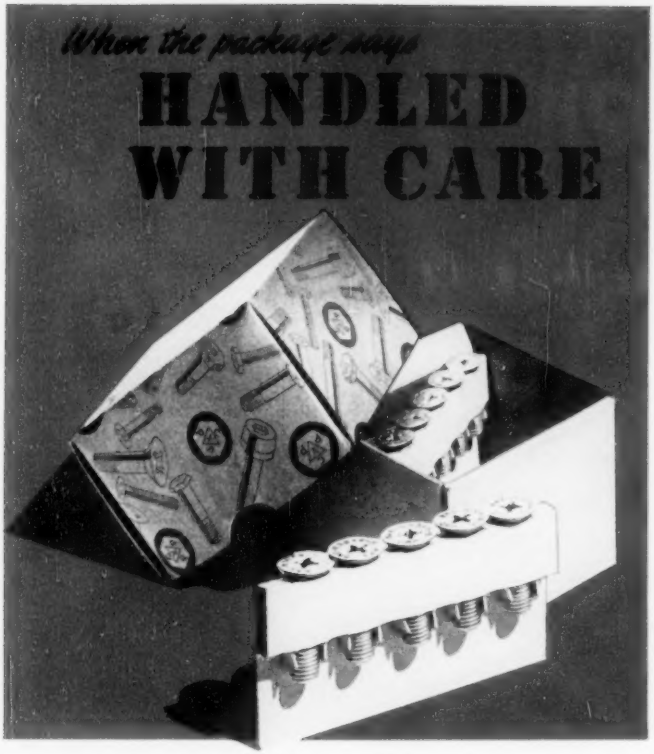

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recovery. Such altitude loss would be particularly true in the event a power-on spin was experienced. The spin would be steep with the nose down about 55 degrees from the horizontal, and the rate of descent would be about 10,500 feet per minute. The force necessary to move the controls in a spin might be so high as to require the combined efforts of the pilot and co-pilot.

Company records reflected that in addition to the aircraft, the company and crew were properly certificated. Each crew member had an adequate rest period prior to the flight.

ANALYSIS

Testimony of eyewitnesses indicates conclusively that the aircraft entered a spin approximately 3,200 feet above the terrain. Inasmuch as United's Denver Training Center curriculum prohibits spins and aircraft are not brought to a full stall, and since examination of the wreckage revealed no evidence of failure or malfunctioning of the aircraft or any of its components, it must be concluded that this spin was entered inadvertently. The fact that partial recovery was effected before impact is further substantiation that there was no failure or malfunctioning of the aircraft.

From the results of spin studies made by the NACA on this type of aircraft, which indicate that an altitude loss of approximately 3,000 feet will occur before full recovery can be effected, it is apparent that the spin in this instance was entered at an altitude too low to permit recovery from the dive, although rotation was stopped.

It appears that United Air Lines was lax in not giving trainees ground instruction on spin characteristics and spin recovery techniques prior to this accident. This situation has been remedied however, by inclusion of such instruction in the training center curriculum.

FINDINGS

On the basis of all available evidence, the Board finds that:

1. The company, the aircraft, and the crew were properly certificated.

2. The load was properly distributed within approved center of gravity limits and the aircraft was lightly loaded, carrying only the crew in addition to the fuel, oil and ballast.

3. No malfunctioning of the aircraft or its components was reported prior to the accident, and no evidence of malfunctioning or failure was indicated by examination of the wreckage.

4. The aircraft stalled at an altitude of approximately 8,200 feet MSL (about 3,200 feet above the ground), entered a spin, and crashed before recovery could be effected.

5. Power was being developed by both engines upon impact.

PROBABLE CAUSE

The Board finds that the probable cause of this accident was an inadvertent spin at an altitude too low for recovery.

THE CIVIL AERONAUTICS BOARD

/s/ Donald W. Nyrop
/s/ Joseph P. Adams
/s/ Chan Gurney

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Conclusion — A pressing need for a let-down aid available to airlines. Furthermore, the equipment must: (1) be designed for operation with present VOR airborne equipment. (2) be low-cost to justify its use in low density locations. (3) be placed on the airport itself for real estate, installation and maintenance savings. (4) be off-the-shelf equipment, using circuit designs thoroughly proved in service.

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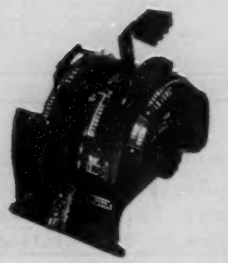

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Lee, Member, did not participate in the adoption of this report.

Supplemental Data

INVESTIGATION AND HEARING

The Civil Aeronautics Board was notified of this accident at 0820, December 4, 1951. An investigation was immediately initiated in accordance with the provisions of Section 702(a)(2) of the Civil Aeronautics Act of 1938, as amended. A public hearing was ordered by the Board and was held in Denver, Colorado, on December 18, 1951.

AIR CARRIER

United Air Lines, Inc., is a Delaware corporation, with its general offices at 5959 South Cicero Avenue, Chicago, Illinois. The company is engaged in the transportation of persons, property, and mail under certificates of public convenience and necessity issued by the Civil Aeronautics Board. It also possesses an air carrier operating certificate issued by the Civil Aeronautics Administration for operations over its various routes. The company maintains a Flight Training Center for its personnel at Denver, Colorado.

FLIGHT PERSONNEL

Captain Jordan D. Kocher, instructor, age 37, was employed by United Air Lines on July 28, 1944. He held a valid airman certificate with an air transport rating for single and multi-engine land aircraft. Captain Kocher had a total of 5,793 flying hours, of which 2,404 were in DC-3 equipment, and 93 hours of instrument flying time. Captain Kocher received a CAA physical examination on May 28, 1951, and his last company physical examination was accomplished on October 30, 1951. He was temporarily assigned as a flight instructor at the Flight Training Center at Denver on October 24, 1951.

Trainee First Officer Laurence G. Wilson was employed by United Air Lines on September 28, 1951. He was the holder of a valid airman certificate with a commercial pilot rating for single and multi-engine land aircraft. He had a total of 1,250 flying hours, of which 100 were instrument. Mr. Wilson had received eight hours and 41 minutes of flight instruction in DC-3 aircraft at the time of the accident. His last physical examination was accomplished on September 1, 1951.

Trainee First Officer Wayne C. Moen was employed by United Air Lines on September 28, 1951. He held a valid airman certificate with a commercial rating for single-engine land aircraft. Mr. Moen had received ten hours and eight minutes of flight instruction in DC-3 aircraft at the time of the accident. He had a total of 990 flying hours, of which 25 were instrument. His last physical examination was accomplished on July 5, 1951.

THE AIRCRAFT

N-17109, a Douglas DC-3A, Serial No. 4999, was owned and operated by United Air Lines, Inc. It had a total of 15,041 flying hours and was currently certificated by the Civil Aeronautics Administration. It was equipped with two Pratt & Whitney R-1830 engines, and Hamilton Standard propellers.

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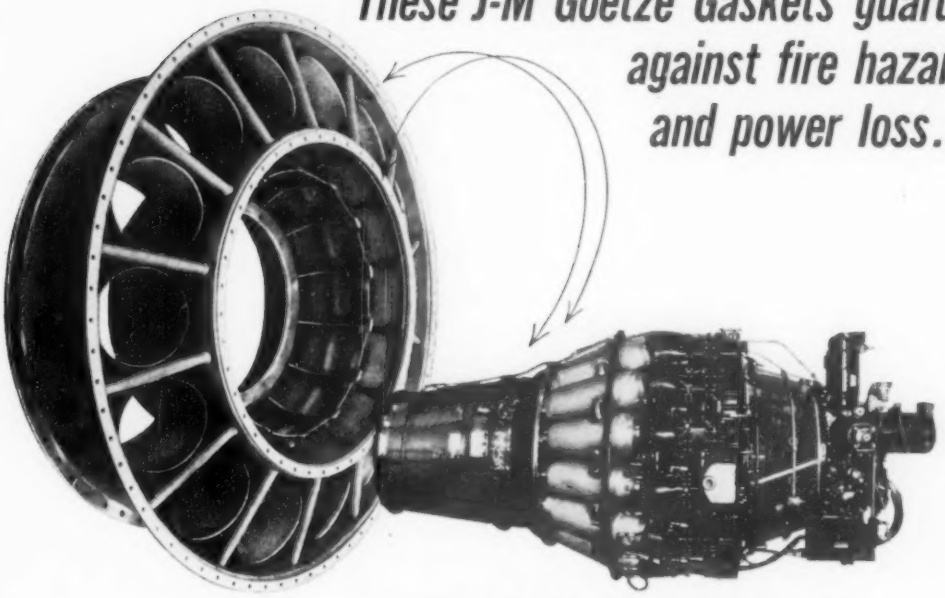

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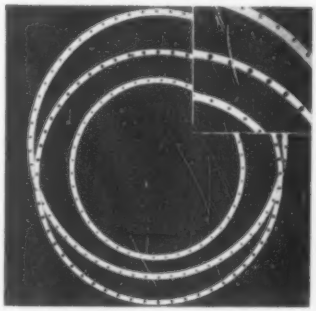
...on powerful turbojet engines like the J33

Sealing the inner and outer annulus on the J33 to prevent leakage of fuel and flame into the airframe is another example of the many tough, critical sealing jobs entrusted to Goetze custom-crafted metallic gaskets.

For this particular service condition, the Goetze gasket specified is made from a flat gasket design... with the metal on both edges rolled around an asbestos filler. This construction provides the resilience needed to overcome the warpage encountered in these applications. Like all Goetze gaskets, this style is precision-made to fit tight and stay tight in service.

There is a Johns-Manville Goetze gasket for practically every jet aircraft requirement. Goetze craftsmen can fabricate them in almost any shape or size for sealing igniters, compressor bleed-offs, cross ignition tubes, combustion chambers, fuel nozzles, turbine drain lines, etc. Backed by more than 60 years of Goetze "know-how," these durable gaskets are solving many of industry's most complex sealing problems.

Why not write for further information about Johns-Manville Goetze gaskets... and other J-M flight-proved products for the aviation industry. Ask for your copy of Brochure AV-1A. Address Johns-Manville, Box 60, New York 16, N. Y. In Canada, 199 Bay Street, Toronto 1, Ontario.



Close-up of J-M Goetze metallic gaskets used as inner and outer annulus gaskets on jet engine turbine frame.

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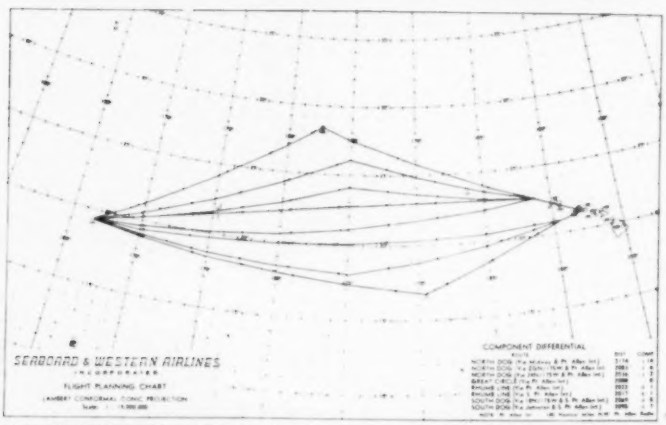
S&W's 3-Way Approach Makes Money

SUPER CONSTELLATION deliveries in 1954 will be shot in the arm, but S&W's . . .

CONVERTIBLE DC-4S are now taking care of double-duty cargo-and-passenger job.



FLIGHT PLANNING OVERLAY chart developed by Seaboard is superimposed on regular weather map to help navigator plot fastest path; method is described on p. 62.

- **The keys: utilization, navigation, load factor.**
- **Passengers contribute to cargo line's volume.**

By George L. Christian

Los Angeles—A proficient team of navigators, highly trained to take advantage of up-to-the-minute weather information, is an essential key to Seaboard & Western's ability to haul its heavy loads across Atlantic and Pacific in the fastest time. And so effective is the work of these weather-conscious navigators, that when the true air speed of S&W's DC-4s is compared with ground speed, the latter is almost always greater.

▶ **Recipe for Success**—Add to the emphasis on navigation the carrier's intensive program of stripping every ounce of unnecessary weight off its DC-4s, plus a hard-hitting, systemwide drive of stretching aircraft utilization to the utmost, and you have the basic ingredients of S&W's success in over-ocean flying.

The company has flown over 50 million freight ton miles since it started operations in May, 1947. Of this, 26.8 million were carried in 1951, a gain of 183% over the previous year. S&W also carried over 11,000 passengers 55.5 million passenger miles and made 960 ocean crossings last year. This business brought in operating revenues of $10.8 million and a net income of half a million dollars.

The all-important threads which tie the airline together are speedy, efficient point-to-point and air-to-ground communications. In the Atlantic, communications are handled by Nartel; in the Pacific, by Airinc and CAA. (Example of speed of transmission: a position report from an airplane on the Tokyo-Wake Island leg was received in Los Angeles in 36 min.; distance is 7,750 mi.)

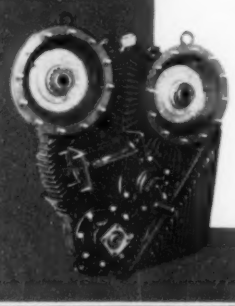
▶ **Weight Savers**—Carl Brell, S&W's vice president, operations, outlined some of the steps in the airfreight carrier's growth to maturity.

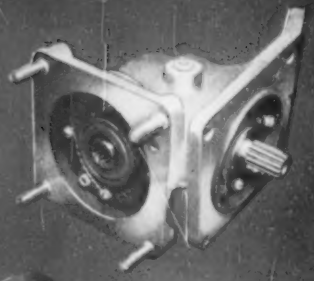
Brell pointed out that a systematic and thorough weight reduction campaign, activated when Seaboard got its DC-4 fleet, has paid off. Seaboard's DC-4s now weigh in at some 1,500 to 2,000 lb. less than standard similar

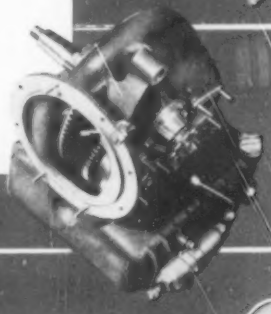
HEADQUARTERS

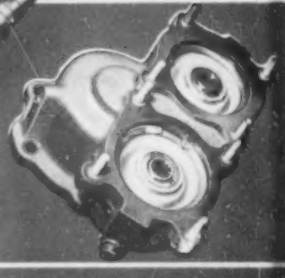
FOR

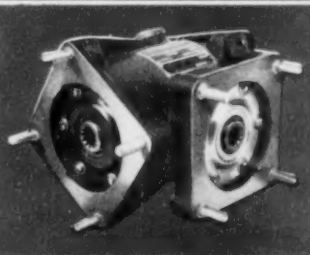
AIRCRAFT ACCESSORY DRIVES

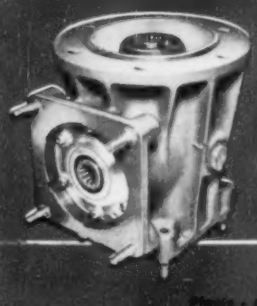












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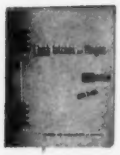

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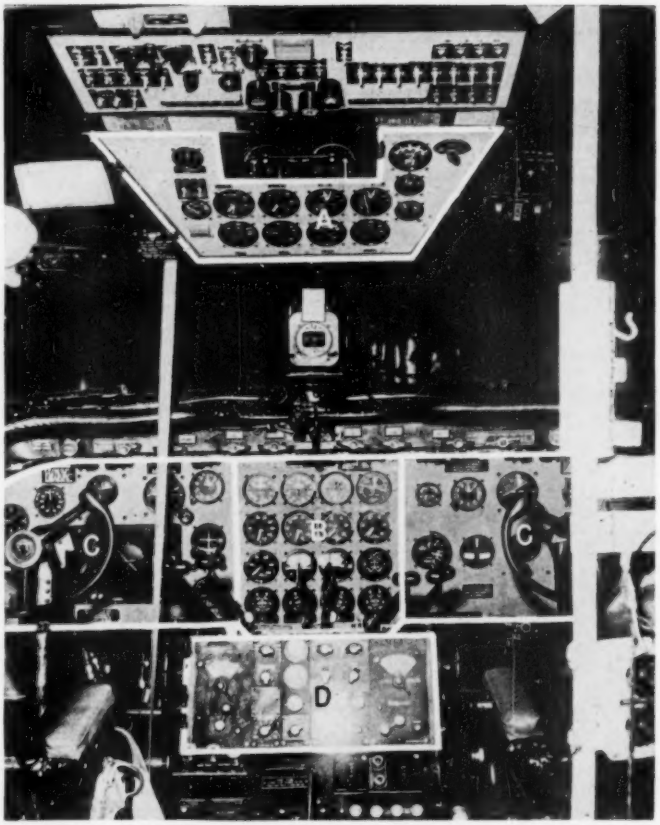

REVAMPED DC-4 PANEL groups controls and indicators by function: (A) liquid quantity gauges; (B) engine instruments; (C) flight indicators; (D) radio controls.

aircraft. (S&W had been operating eight DC-4s, but recently acquired a ninth from Braathens.)

Here are some places where the poundage came off:

- **Lightweight fuel tank sealant** saves up to 300 lb. per plane.
- **Removal of plywood floor** in the fuselage threw out another 300 lb.
- **"V" board** (used from floor to window height) and Skyfelt head-liner replaced original soundproofing.
- **Plush galleys and toilets** were removed.
- **Oxygen system,** except for the crew, was eliminated. Emergency walk-around bottles are now available for passengers.
- **Loading crane** and structural supports were discarded.
- **Alternate carburetor** air door and operating mechanism was junked.

▶ **Convertible Aircraft**—When Seaboard & Western went into "convertible" aircraft for either freight or passengers, it did not add any unnecessary frills.

Foldaway "payloader" seats were installed. Lightweight and strong, they have several advantages, S&W says. When plane is used for cargo, seats can be folded against the side of the fuselage in a matter of minutes. And the under structure of the seats is stressed to provide tiedown locations for cargo, when it is carried.

Reconversion to a passenger interior can be accomplished in a fraction of the time normally required to bring seats into the plane and attach them to the floor fittings.

Maintenance savings on the seats are considerable. The foldaway seat requires little maintenance; but the removable units were always in the shop for leg-straightening and other patching up.

S&W DC-4s flying the North Atlantic can carry 67 passengers. A simplified galley allows cabin attendants to serve light, cold snacks and hot liquids. Substantial, hot meals are served on the ground.

Seaboard officials point out that a flexible aircraft is needed in their business. Many flights go loaded with

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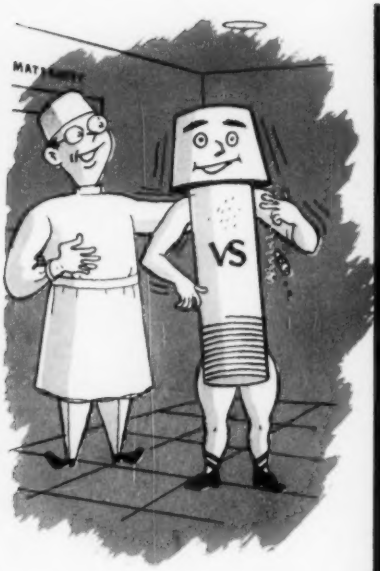

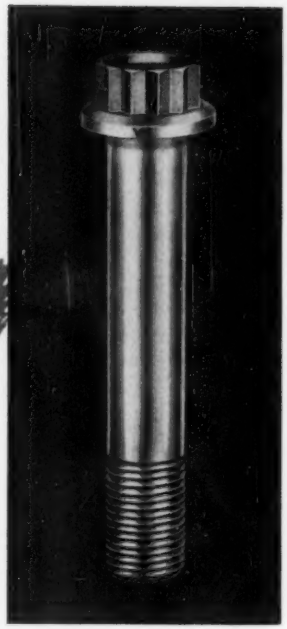

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cargo but come back with passengers.

► **More Payload**—Seaboard has used various methods to increase potential revenue from its fleet of aircraft.

To boost payload, S&W engineers suggested that takeoff wing flap settings be reduced from 15 to 12 deg. This allowed a sea level takeoff weight increase from 70,700 lb. to 71,800 lb. Price paid for this payload hike was an increase in required runway length from 5,200 to 6,040 ft. But at most of the stations through which the carrier operates, the runways have ample length to allow this increased takeoff run.

Seaboard officials say that this change has increased takeoff safety performance because the ship gets off the ground at higher airspeeds and with less drag using new flap setting.

Takeoff weight will be further increased to 73,000 lb. when the airlines' R2000 engines are converted to the —13 configuration. Airwork started the conversion for Seaboard in June. Here are the maximum takeoff weights allowed with different dash number R2000 engines, according to S&W:

Engine model	TO Wt. lb.	Max. TO hp.	METO hp.
R2000-7	70,700	1,350	1,100
R2000-11	70,700	1,350	1,100
R2000-9	71,800	1,450	1,200
R2000-13	73,000	1,450	1,200

To simplify the pilot's job, Seaboard revamped the DC-4 instrument panel. All fluid quantity gauges were put in the overhead panel (fuel, oil, hydraulic and alcohol). Engine instruments (rpm., manifold pressure, temperature, etc.) were gathered in the center of the panel, equally visible to either pilot. Flight indicators were placed squarely in front of pilot and co-pilot.

► **Increased Utilization**—A plane's earning capacity obviously is increased if its empty weight goes down and its performance goes up. Seaboard's long, over-water hauls help the carrier to boost fleet utilization. S&W racked up a high utilization figure of 15.3 hr. last August. And this figure includes all maintenance performed on the aircraft except major (11,000-hr.) overhauls. Overall utilization in 1951 was 13.6 hr., up sharply from 1950's 8.6.

Revenue flight time exceeds 55% of total available hours; at present close tab is kept on the reason for each flight delay. If delays at one station are repeatedly due to lack of spare parts, additional stocks are added. If another station shows a deficiency in mechanics, its ground personnel roster is bolstered. Thus, a constant vigil on the reasons for delays help to erase all but the more unpredictable variety.

Competition between stations to reduce ground time has paid off well. In one year the Tokyo station reduced on-off time from 4:32 hr. to 2:52 hr.—and this time includes unloading, re-

loading and fueling the ship. Ground time per Pacific roundtrip was reduced by 8:13 hr. in 1951.

Seaboard's fetish is to make its crews superconscious of saving time, even in terms of a few minutes.

For best utilization and load factors, Seaboard tries to carry the heaviest payload and fly it from A to B as fast as possible. The carrier takes advantage of a Customs delay to get higher load factors. Freight arriving in the United States on Saturday or Sunday is usually held up by Customs until Monday; so a carrier can hold a flight at point of origin for a couple of days at the weekend, waiting for a full load, without penalizing its customers.

▶ **Navigators' Contribution**—How S&W goes about getting the most cargo into its aircraft has already been discussed. How to get it around the world as fast as possible is strictly a navigational problem.

Stated in simplest terms, Seaboard's navigators use an advanced form of pressure pattern flying to come up with a composite track which is equivalent to the fastest route from point of departure to destination, considering existing wind conditions.

Such emphasis on navigation is profitable—ground speed of S&W's DC-4s is almost invariably greater than TAS (true air speed). This is how it figures out in dollars and cents: Accurate navigation saved 382.8 flying hours in seven months; Seaboard officials use $300 as the total per hour operating cost of a DC-4; total savings—$114,840.

S&W is now looking forward to the arrival of its five Lockheed 1049 Super Constellations in 1954. Their greatly increased ceiling will make it possible to take advantage of the much greater wind velocities at high altitudes. Their operating costs are higher, but this will add importance to savings in time and money.

▶ **Weather Key**—"Precise handling of meterological navigation, supplying a competent navigator with additional weather information as his flight progresses, and training the navigator how to use this information to the greatest advantage has enabled Seaboard & Western to operate over minimal flight paths with great consistency," says the airline's chief navigator, John W. Robinson.

But competent navigators are hard to come by. Robinson says S&W has developed a method of grading and determining the proficiency of its navigators to make sure that each man sustains the high level demanded by the airline. Not everyone has the native talents to be a skilled navigator, in Robinson's opinion.

Seaboard's navigation team consists of a ground navigator, a flight navigator and the aircraft's captain. Final deci-

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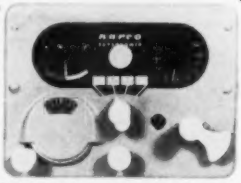

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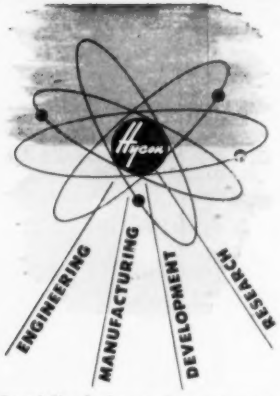

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sions are in their hands. The ground navigator, working in the flight control section of the navigation department, uses meterological information supplied to him by the Weather Bureau and by aircraft flying in the area he is interested in. He tailors the track of a forthcoming flight to the exact times and altitudes the flight will operate, and pre-plans fuel and cargo loads over the entire trans-Pacific route.

His second duty is to supply the in-flight navigator with a continuous source of navigationally analyzed upper air information.

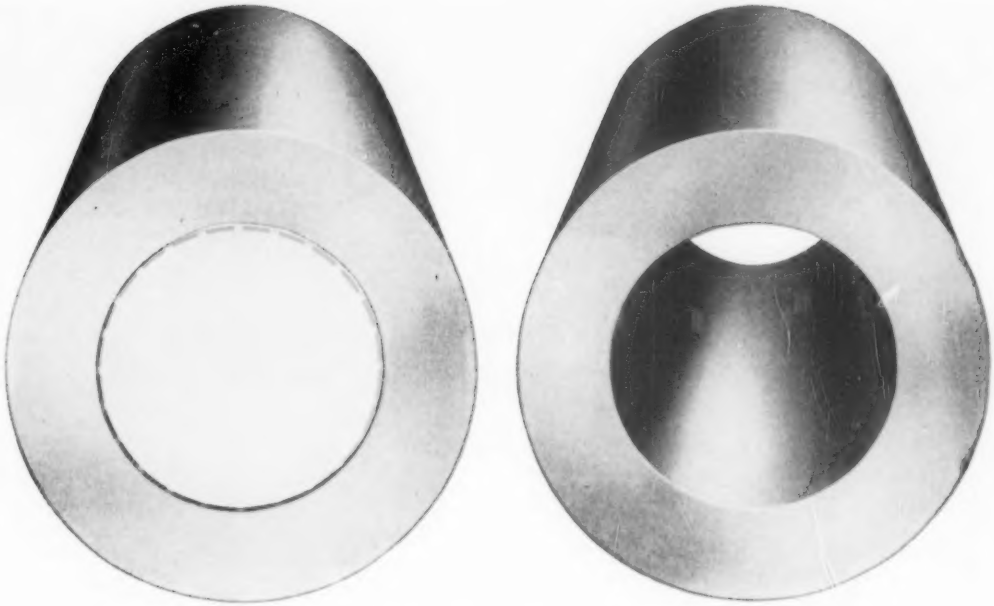
▶ **Helpful Chart**—A big help to the airborne navigator is an S&W-devised transparent overlay flight planning chart. One chart has been made up for each leg of the trans-Pacific flight. On the chart have been laid out several tracks north and south of the great circle route. The outermost tracks cover the greatest reasonable deviation from course.

In the corner of the chart are listed component differentials, giving exact distances for each track, and the wind components required to make that track worthwhile. These transparent charts, superimposed on standard weather maps, allow the in-flight navigator to compare information on the two maps. Furthermore, he is continuously gathering his own weather data on the spot. As a result of all these data, he manipulates his track to conform with the existing pressure structure, and draws, in flight, an actual composite chart of the constant pressure surface at the altitude at which the aircraft is operating.

▶ **Continuous Analysis**—This continuous analysis enables him to anticipate the flight in its entirety and to "navigate ahead of himself instead of behind himself," in Robinson's words. "This meterological approach to navigation allows a navigator to do more than simply fix his position in the sky."

"A year and a half ago, very little could be done about improving flight time across the mid-Pacific route because of the light gradient associated with high pressure systems prevalent over the route from San Francisco to Tokyo," Robinson says. "But Seaboard found that, by using the highest caliber navigators, by exploiting their potential to the utmost, and by concentrating on minimal flight path operation, it was possible to better flight times and payloads over this route." The accompanying charts and data graphically illustrate the validity of Robinson's statement.

He adds: "These results were achieved in the mid-Pacific where weak pressure systems prevail. . . . It can be assumed that a proportionately greater benefit would accrue to any company operating similarly over the North At-



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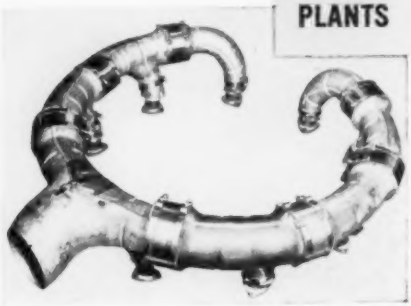

Multiple Take-up Clamp Simplifies Shroud Connections

The collector ring of the Piasecki HUP-1 helicopter is shrouded to insulate the structure from heat produced by the buried engine. Marman multiple take-up clamps provide a simplified means of coupling the titanium shroud sections together. A very slight modification of a standard clamp design was employed to accommodate this specialized application. Clips were spot-welded to the edge of the clamp, enabling it to apply a coupling action in addition to the clamping action usually associated with this type of clamp. This clamp brings about significant savings in weight, cost and time of assembly and disassembly. The patented T-Bolt latch assures a vibration-proof positive seal at all times.

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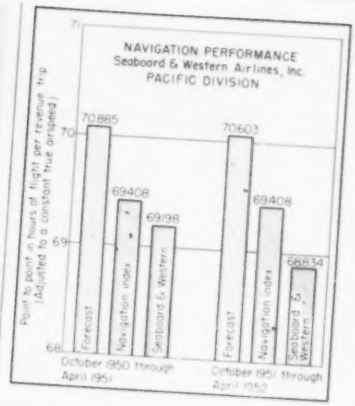

lantic routes which are dominated by correspondingly stronger pressure systems." (Since the start of the Pacific Airlift, S&W has taken all but one of its DC-4s off the Atlantic run, so is unable to take full advantage of the system over that ocean.)

"The gain attributed to navigation has been determined by comparing Seaboard & Western performance with the Navigation Index," Robinson explains. "For this it represents absolute **minimum** gain and is incontestable. This index represents the maximum efficiency attainable through the use of conventional navigation methods. For purposes of comparison, it may be given a value of 100%. The periods of comparison used were October, 1950-April, 1951 and October, 1951-April, 1952." The gain in the later period is attributed by Robinson to the fact that the flight control system went into effect then. Until FCS was started, the navigators individually, in an unorganized fashion, did their best to take full advantage of winds, etc.

► **Dollar Economy**—"Since the Index was determined by assuming an operation was conducted over a minimum distance (or Great Circle) track, it follows that this figure is extremely conservative," Robinson says. "The revenue trip time, represented by the Navigation Index, can be reduced only by operation over Optimum Tracks or by successful divergence from Great Circle Tracks into areas where favorable wind components exceed the adverse effect of additional distance.

"The increase in navigation productivity, after one year of operation under the flight control system, amounted to 204.04%, and may be given a dollar value by applying either of the following formulae: 125,918 hours × cost per flight hour; or 24,708,763 revenue miles × income per revenue mile." Comparing two seven-month figures, of 13,593 hr. and 14,992 hr. respectively, $28,831.50 was saved by hav-

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When they "set down" at Grand Rapids...

● Furniture and flying are two big things at Grand Rapids, Mich. This town is the famous furniture center of the U. S. and the site of many another healthy industry. Handling over 50,000 passengers a year, Grand Rapids' Kent County Airport is one of the Midwest's busiest. More than 100 private plane owners call it home base. Now, when flying businessmen and others "set down" at this well-equipped field, they're sitting pretty on several counts—including the availability of high quality Standard Oil Aviation products.

Northern Air Service operating at the field features Standard Aviation products. "We've been selling Standard Aviation Gasoline since 1942 because we believe it is the best and our customers depend on it," says manager O. C. Hall. This modern airport has mobile refueling units, rent-a-car service and complete repair facilities. Hundreds of airports throughout the Midwest display Standard's famous Torch and Oval, the flier's assurance of dependability and uniformity.

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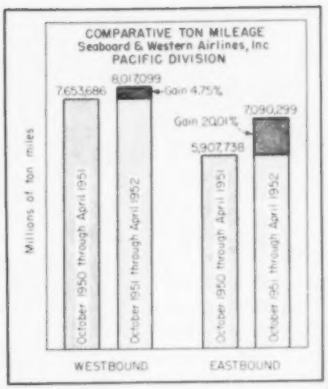

ing a ground speed greater than true air speed.

An important underlying factor contributing to the success of Seaboard's precision flight control system is the skill of its navigators. Average experience of men assigned to this duty is approximately 12 years and 6,000 flight hours. The composite group was drawn from every major organization in the industry, according to S&W.

► **Into the Future**—The carrier is working hard towards still more precise navigational methods. Brell thinks that electronic digital computers may play an important part in refining navigation of the future. The machines could assimilate and correlate navigational information very rapidly.

Learning how to fly the freight economically has not been easy, and there are still many problems to be solved. But Seaboard & Western's management is sure freight is a paying proposition and that the future is unlimited.

The next stride forward will be to put the 1049 Super Constellations into service. The great increase in speed and carrying capacity of these planes, coupled with meticulous attention to weight saving, and high utilization through use of refined navigation, will be the big payoff, S&W feels.

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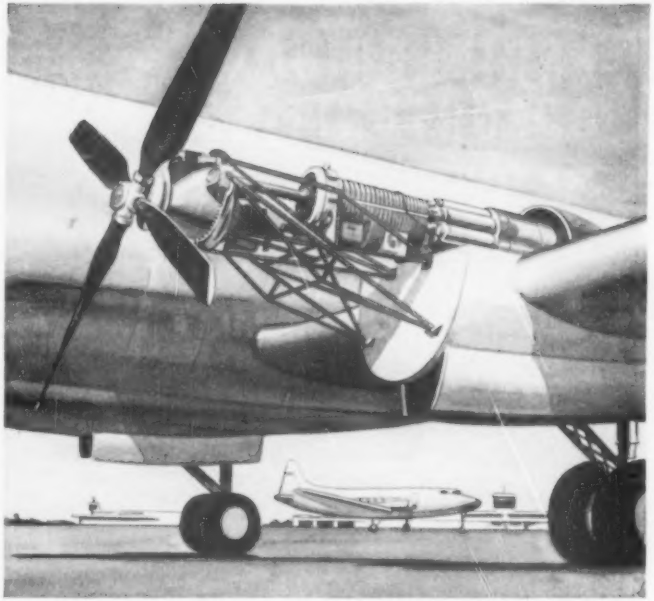

Aircraft Tubing has a Heavy Responsibility

From the time the Wright brothers made their first attempt at flight to the present day turbo-jet transports and bombers, steel tubing has quietly played its important role in all planes. Engineers and all others concerned with the production of aircraft agree that when strength, dependability and lightness are a factor they look to steel tubing to do the job.

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Airborne-Portable Analyzers Preferred

Deposit, N. Y.—Analyzers, both ignition and engine, have proved their worth to the aviation industry. This was the theme of a three-day ignition and engine analyzer conference recently sponsored by Scintilla Magneto division of Bendix Aviation Corp.

Several thousand analyzers are either in use or on order. Although used in greater quantity by the military, more than 60 airlines, fixed-base operators, airframe and engine manufacturers, and test centers are using analyzers to help them peer inside internal combustion engines and finger malfunctions as they arise.

► **Engine Detective**—Often the analyzer detects an incipient failure soon enough to avoid complete destruction of the engine. It pinpoints troubles, especially ignition types, and can rapidly distinguish between magneto malfunctions and spark plug failures, or any other type of ignition breakdown.

In the case of plugs (56 are carried on each R4360 engine) it quickly picks out offending units, avoiding time-consuming and costly changing of entire sets of plugs.

► **Portable-Airborne Best**—Consensus of opinion at the conference seemed to be that the most practical general type of installation was the portable-airborne configuration. In this setup, the aircraft is wired to receive the analyzer and the synchronizing breaker is permanently installed on each engine. The analyzer, kept at major stations, may quickly be plugged into a receptacle in the aircraft and put to use when necessary.

Objections were voiced against the other two types:

• **Portable:** Hooking up the required wiring and synchronizing unit every time an engine needs analyzing is too time-consuming. Most mechanics will still start pulling plugs or magnetoes before bothering with an analyzer under these conditions, even though they may end up by spending more time by the hit-and-miss method of troubleshooting.

• **Airborne:** It is costly, in that each plane is permanently equipped with an analyzer. It involves a weight penalty and raises the problem of where to locate the analyzer conveniently in the usually crowded cockpits of today's aircraft. And, in aircraft carrying only two crew members, there is nobody to read the instrument.

Although much of the meeting was a review of facts already relatively well known in aviation circles, there were many interesting new facts and data brought out by conference chairmen and speakers. One interesting point was that the analyzer is really not an

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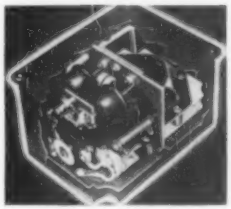
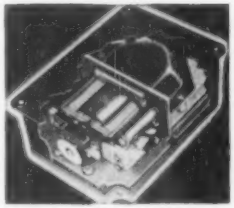


Hartman A-750D 400-ampere 28-volt reverse current cutout.

Hartman A-751D 400-ampere 28-volt contactor for aircraft with panelized systems



● Thousands of operating cycles at rated capacity under conditions of wide ambient temperatures, humidity, dust, altitude, vibration, acceleration, shock. Add to this the possibility of 28-volt generators producing up to 175 volts if a failure applies full field at high rpm as on takeoff. These rugged conditions demand the utmost in interrupting capacity.

That's why leading airlines use Hartman high interrupting capacity switches in their Convair 340 and Douglas DC-6B and DC-7 aircraft. For the new Hartman reverse current cutouts and contactors have an *interrupting capacity greatly in excess of all requirements from sea level to 50,000 feet.*

Dependability and safety of these units is typical of many other Hartman aircraft control devices. So if you have an AC or DC control problem, turn it over to Hartman for speedy solution. A-5786

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Douglas DC-6B

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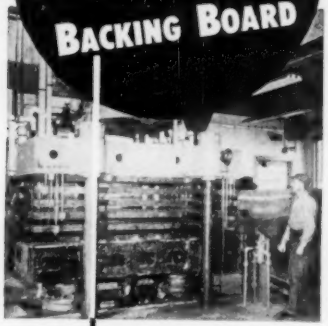

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analyzer at all but an ingenious device permitting the observer to do the analyzing.

► **Attendance**—Of the 160-plus men attending the meeting, 27 represented foreign airlines, 21 the USAF, and 17 the U. S. carriers.

Other organizations represented were airframe, engine and spark plug manufacturers, BuAer, CAA, and foreign military and government representatives and airframe manufacturers.

The conference, held at a summer resort hotel, was organized by Robert Bover, Jr., Scintilla senior sales engineer.—GLC

OFF THE LINE

The feminine touch has crept into Korean frontline air bases. GIs in the parachute department noticed with a chuckle that the chutes' packs display neat little labels reading "Manufactured by Fashion Frocks, Inc."

Inevitable nickname given to the Panmunjom-Munsan truce area in Korea by USAF pilots, who avoid it like poison is "The Holy Land." And a sign appearing outside of a dusty officer's club near Seoul reads "Bottom of the Mark."

Example of the extent to which the USAF goes to make use of every cubic inch of space on a jet fighter is putting spare wingtip tank lights in the tank tailcones. This makes them readily accessible too.

Aerodex, Inc. of Miami, Fla., has received a new contract to recondition an undisclosed number of USAF twin-engine transports.

LONG ARM MAINTENANCE

Elevator service is provided by this mobile boom for ground crewmen who must gain access to high points on today's towering aircraft (detailed story in Aviation Week, June 23, p. 68). The boom is directed by footpedals in the cage at its tip. It can be raised, lowered, or rotated hydraulically to speed checkout of external gear.

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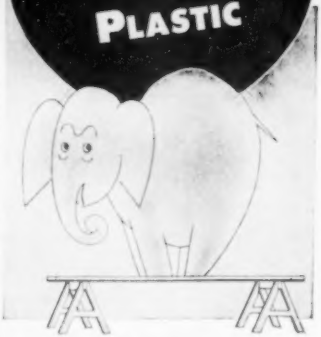

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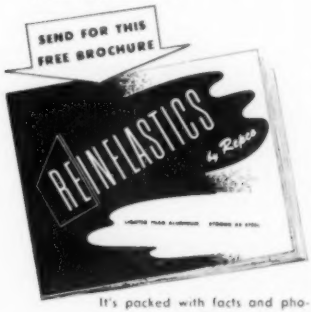

It's packed with facts and photos of all the processes referred to in our ads on this spread.

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NEW AVIATION PRODUCTS

Wet or Dry Inside? Detector Tells

A moisture detector which can look inside sealed packages and even cocooned aircraft, is being studied by the Air Force.

The Hydrotector, developed by American Instrument Co., tells whether the package seal is good or bad, and whether or not the dessicant used in the package is keeping moisture in safe limits.

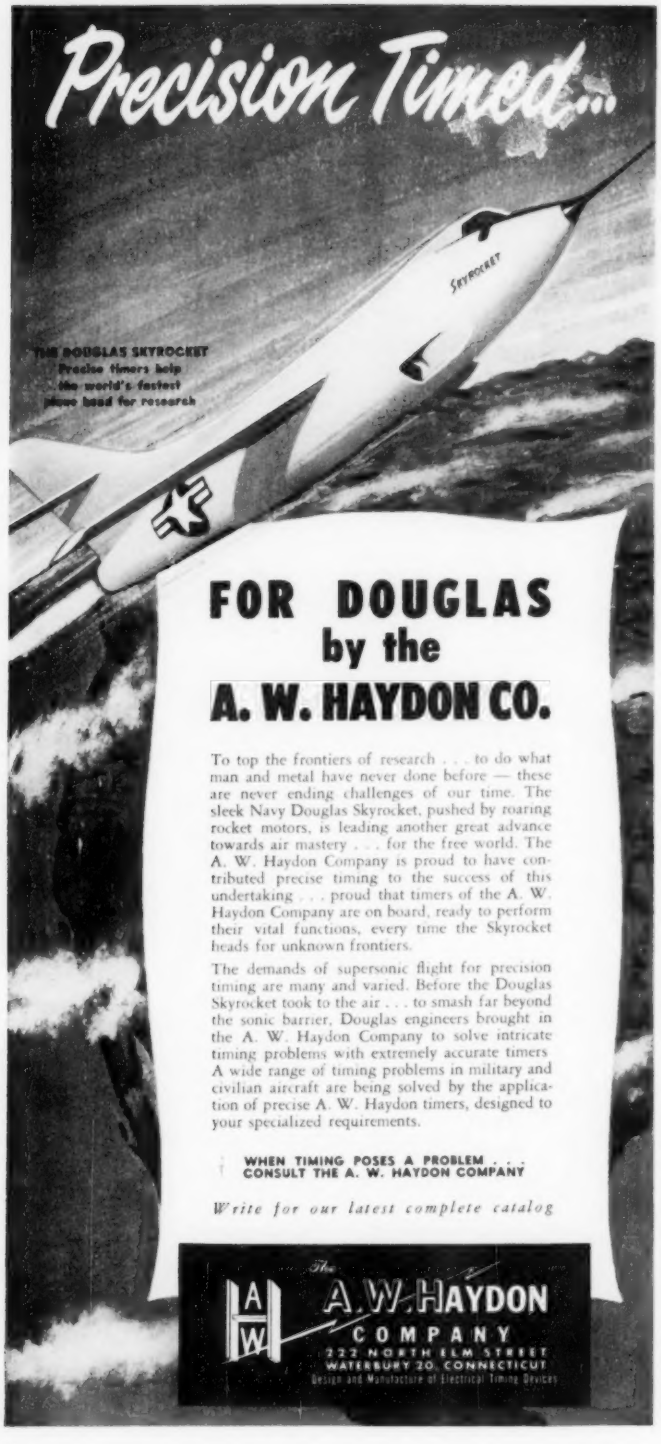
The Hydrotector includes a sensing element which can be put inside an already sealed package by means of special tools supplied with the kit. A mounting for the sensing element, or the electrical lead to the element if it is placed far inside package, can be installed on the surface of the package, working exclusively from the outside but still retaining an effective seal. Installation is not difficult. The sensing element can be added to old or new packages, already stored or just being made up.

The system is applicable to virtually any sealed package—for cocoons sealing aircraft being shipped above decks, mothballed equipment, strippable-film packs for avionics equipment and such, flexible moisture-barrier packs, metal containers for jet engines.

▶ **Read the Dial**—To obtain a reading from the sensing element permanently installed in these packs, the kit includes a portable indicator box with a sling strap so it can be carried by the inspector.

An electrical cable leading from the indicator box has contact points which can be touched to a mating contactor on the surface of the package to complete a circuit from the indicator to the sensing unit. On contact the indicator tells instantly and accurately whether moisture content in the container is within "safe" or "unsafe" limits, the company says. Since the dial is scaled, records can be kept to indicate rate of leakage—whether it is fast or slow. And since all that is required is a quick contact of two electrical connectors—no actual plugging at all—one person can determine moisture conditions in a large number of packages within a short time.

▶ **Army-Approved**—The Hydrotector has been approved by the Army and will soon have Navy and Air Force acceptance, Aminco reports. The firm believes the device will save millions of dollars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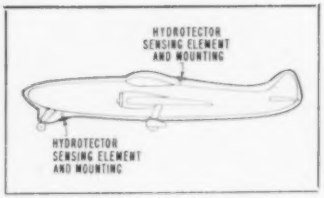

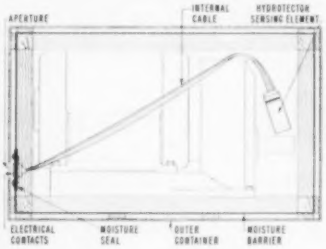

annually by keeping close tabs on moisture and foiling corrosive attacks.

Cost of installing Hydrotectors is less than a standard military "random sampling inspection that involves the destruction of packs," Aminco claims. The Army's approval involves Method II (moisture-barrier) packs. As for the Hydrotector's AF potential, about ¼ million different items must be packed in quantity by Method II.

There have been other means of checking moisture content in a package —usually a fragile window in a package protecting a humidity indicator of hair, plastic or silica gel. None of these is nearly as accurate as Hydrotector, Aminco asserts. They can't stand shock as well, nor do they show rate of leakage. Moreover, they are irreversible—don't return to "safe" reading when moisture has been evacuated, the company claims.

▶ **High Accuracy**—The overall system is accurate to 4%, says Aminco, in portraying humidity conditions. Similar equipment made by Aminco for laboratory use has maintained this accuracy now for six years, it notes. The equipment is not new, only the way it is used.

By keeping records of previous inspections (and without requiring excessive training of the operator), the Hydrotector can be made to tell a lot of things about a package.

It can be used to determine whether moisture is increasing or decreasing, pack has big or small leak, moisture is cycling with moisture outside, or being slowly absorbed by pack over long periods, whether dessicant is effective, whether it is controlling humidity or nearly saturated. The sensing element is accurate to temperatures up to 160F.

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Riveting with Hi-Shears is a new 16-mm. color-sound film explaining methods of riveting and inspecting Hi-Shear rivets. Available for loan or purchase from Hi-Shear Rivet Tool Co., 8924 Bellanca Ave., Los Angeles 45. . . . Bulletin 1800-52 describes improved line of series 1800 Shear-Speed **radial gear shapers** built by Michigan Tool Co., 7171 McNichols Rd., Detroit 12. . . . **The Case for Re-Refined Oil** is voluminous presentation of the economics of utilizing oil over and over again. It points out that in many cases the product is superior to the original. Published by the Assn. of Petroleum Re-Refiners, 1917 Eye St., N.W., Washington 6, D.C.

Technical Bulletin 21 presents engineering data and specs of **Trans-Sonics Type 21 resistance thermometers.** Write Trans-Sonics, Inc., Bedford Airport, Bedford, Mass.

New Addresses

British Overseas Airways Corp., has opened a cargo receiving office at 95 Pearl St., New York. Later an entrance will be opened to handle passenger travel inquiries. Manager of the new office is Elbert H. Swenson. Phone is MUrray Hill 7-8900.

Lowes Associates is a recently established public relation consultants firm with offices at 148 E. 47 St., New York 17, and Ridgeway Station, Stamford, Conn. The company is headed by Joseph E. Lowes, Jr. Phones are (N. Y.) Eldorado 5-3280; (Conn.) Stamford 4-6378.

Walmor Equipment Corp. has opened offices in Suite 204, Hangar 8, Washington National Airport, Washington 1, D. C. The firm also has offices in downtown Washington, New York and Los Angeles.

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FINANCIAL

CAB Stabilizes Atlantic Patterns

Board grants seven-year 'temporary' extensions to TWA and PanAm; trans-Pacific routes still scrambled.

Considerable stability is emerging in the route patterns of U. S. carriers flying the Atlantic into European areas as a result of the Civil Aeronautics Board action in the current trans-Atlantic route proceeding.

This affords an interesting contrast to the domestic scene where feverish activity surrounding merger attempts indicates that the continental airline network may yet undergo far-reaching adjustments before route patterns may be considered stabilized.

▶ **The Decision**—In its recent trans-Atlantic decision, the Board, in substance, confirmed the existing route patterns of Pan American World Airways and Trans World Airlines, together with a number of extensions for the two carriers.

• **Pan American**, previously having permanent authority to serve London, Lisbon and Marseilles was awarded a "temporary" certificate extension to serve a number of existing and added points for a period of seven years to July 4, 1959.

• **TWA**, which previously held temporary authorizations for all of its international operations was given a permanent certificate for the route from New York to Paris and Rome and a "temporary" seven-year authorization for certain existing and added cities.

▶ **"Temporary" but Permanent**—For all practical purposes the "temporary" authorizations will have the effect of permanent status in the competitive operations of the two U. S. flag carriers in the trans-Atlantic area. Point-to-point competition will prevail for the two companies to such cities as London, Paris, and Rome, for example, despite the CAB assertion that, "We are not satisfied that the time is ripe for permanent certifications of extended routes to either carrier."

The Board continues that at a later date it might be found that "point-to-point competition between the two carriers at the major European cities was undesirable or that it was not financially sound for the government to be subsidizing service into some cities now served."

It will be recalled that in September, 1950, when the acquisition of American Overseas Airlines by Pan American was effected, Pan American was placed in Paris, Frankfurt and other points. TWA was, at the same time, authorized to serve London. These authorizations are now continued on a "temporary" basis for seven years.

▶ **Other Adjustments**—In addition, the Board made significant adjustments by extending the routes of the carriers as follows:

• **Nice, France**, to Pan American's service to Marseilles while removing that key Riviera resort center from TWA's system.

• **Lisbon and Casablanca**, French Morocco, can now be served by Pan American as intermediate points on its service between The Azores and Dakar, Africa.

• **Rome** becomes an intermediate point in TWA's operations from Cairo and Tunis.

• **Kuwait** at the head of the Persian Gulf will now be served by TWA on its route between Iraq and Saudi Arabia.

• **Lisbon-Foynes, Ireland**, route of Pan American was canceled.

The route patterns thus established

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for the two U.S. international airlines follow a balanced competition concept. At the time of the trans-Atlantic route hearings, TWA sought a series of far-flung route additions for itself at the expense of Pan American. The Board chose not to disturb existing relationships.

► **Balanced Routes**—It is also significant that the elimination of AOA two years ago through its acquisition by Pan American has greatly simplified CAB's problem in the current proceeding. Had a third U.S. carrier remained in this international area the balancing of competitive route patterns would have represented a difficult undertaking at this renewal time. Instead of stability evolving from determinations among the two carriers, arbitrary compromises of route patterns for three separate U.S. lines would have resulted. This would have satisfied no one group and would have created a series of subsequent tenuous actions which would have led to a considerable period of unsettlement.

In other rulings, at the same time, CAB reopened the Seaboard & Western Airlines case and permitted European-American Airlines, Inc. more argument in their applications for all-freight operations across the Atlantic.

► **U.S. Share Drops**—The importance of developing a strong U.S. position in the

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"Alodine" No. 100 forms an amorphous phosphate surface on aluminum which is thin, tough, durable, non-metallic, continuous with and a part of the basis metal. The "Alodine" film anchors paint, prolongs paint life, and protects aluminum exposed unpainted to the atmosphere.

With the "Alodine" No. 100 bath at its normal temperature of 120° F., coating time by immersion approximates 1½ minutes—and by spraying, 15 to 20 seconds. Coating times and bath temperatures can be varied to suit operating conditions.

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"Alodine" No. 600 forms corrosion-resistant coatings that provide excellent protection for unpainted aluminum and also make an effective paint-base. This grade is recommended for use in place of "Alodine" No. 100 on aluminum parts that are to remain unpainted or to be only partly painted; and on *all* aluminum castings and forgings whether or not these are given a paint finish.

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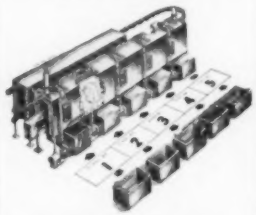

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PROCESS SEQUENCE

1. Clean 2. Rinse 3. "Alodine"
4. Rinse 5. Final Rinse

NOTE: Equipment can be of mild steel throughout, except the "Alodine" stage which must be of acid-resistant material.

"Alodine" No. 600 is applied at room temperature (70° to 120° F.). Recommended coating times are 3 to 5 minutes for an immersion process and 1 to 1½ minutes for a spray process.

COATING DATA	"ALODINE" NO. 100	"ALODINE" NO. 600
COMPOSITION	Amorphous phosphate.	Amorphous mixture of metal oxides and chromates.
COLOR	Depending on alloy treated, color range is from an iridescent blue-green to a dark slate gray.	Depending on time of treatment, color range is from golden iridescent to light brown.
THICKNESS	From 0.01 to 0.08 mil. No appreciable dimensional changes occur when aluminum is Alodized.	From 0.005 to 0.01 mil. No appreciable dimensional changes occur when aluminum is Alodized.
WEIGHT	50 to 300 mgs. per square foot. Optimum: 100 to 200 mgs. per square foot.	35 to 50 mgs. per square foot.
SOLUBILITY	Insoluble in water, alcohol, solvents, etc. Insoluble in most dilute acids and alkalis. However, strong acids and alkalis which attack aluminum may penetrate the "Alodine" film and react with the underlying metal. Slightly soluble in concentrated nitric acid. Soluble in molten sodium nitrate, etc.	Insoluble in alcohol, water, solvents, etc. Soluble in strong alkalis and acids.
ELECTRICAL PROPERTIES	High dielectrical resistance.	This coating is electrically conductive. Aluminum coated with "Alodine" No. 600 can be shielded-arc welded or spot welded.
HEAT STABILITY	Unimpaired at temperatures that melt aluminum.	Unimpaired at temperatures that melt aluminum
FLEXIBILITY	Integral with and as flexible as the aluminum itself. Can withstand moderate draws.	Integral with and as flexible as the aluminum itself. Can withstand moderate draws.
ABRASION RESISTANCE	Approximately 90% of that provided by chromic acid anodized aluminum.	Approximately 90% of that provided by chromic acid anodized aluminum.
CORROSION RESISTANCE	Painted—superior to chromic acid anodizing. Unpainted—comparable with chromic acid anodizing. Meets MIL-C-5541 and other Government Finish Specifications.	Exceeds requirements of MIL-C-5541 and even AM-QQ-A-696 (anodic films)
PAINT BONDING	Excellent. Equal to or superior to anodizing. Meets MIL-C-5541 and other Government Finish Specifications.	Excellent. Meets MIL-C-5541 and other Government Finish Specifications.
TOXICITY	Non-toxic.	Non-toxic.
BIMETALLIC CORROSION RESISTANCE	Shows good resistance against bimetallic or galvanic corrosion.	Shows good resistance against bimetallic or galvanic corrosion.

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CHEMICALS ACP PROCESSES

trans-Atlantic market becomes evident from an analysis of recent traffic trends. In 1951 the two U.S. flag airlines competing with nine foreign air carriers (there were only seven in 1950) carried 50% of the passengers traveling by air between U.S.-Canada and the European continent.

This was down from 56% in 1950, 61% in 1949, 70% in 1948, 73% in 1947, and 83% in 1946.

At the outset, foreign carriers were at a disadvantage due to the lack of adequate and modern equipment. Since the equipment situation is improving, they are strong contenders for a growing share of international air traffic, particularly as most are either subsidized or controlled by their respective governments.

Furthermore, the British, and possibly others, may assume leadership in jet transport travel which will carry with it a strategic advantage in trans-Atlantic air travel.

► **Other Problems**—Stabilizing the route patterns of U.S. carriers in other international areas promises to be more troublesome. Sometime next year the first of a series of route authorizations in the Pacific area will be up for renewal before the Board.

Significantly, in the current trans-Atlantic proceeding the Board deferred TWA's application to renew its route east of Bombay and for an extension into Tokyo. Presumably this will be included for consideration in the trans-Pacific hearings.

This particular phase is likely to encounter strong opposition from Northwest Airlines. That carrier, now flying to Tokyo, is also authorized to serve Shanghai. TWA was to have come up through India to connect with Northwest at that point. With the Communist influence disturbing the Chinese area, service to that country by any U.S. carrier has been out of the question. Hence, in addition to resolving the contentions of TWA and Northwest over this segment, CAB will be faced with the problem of establishing a method of by-passing China from India to Japan.

► **Pacific Routes**—A key determination in the trans-Pacific proceeding will, of course, be in the route renewal of Pan American and Northwest from U.S. West Coast points to the Orient, with Hawaii figuring prominently as an intermediate point. In addition, United's certificate from San Francisco to Hawaii will also be up for renewal in October, 1953.

The Board will have an opportunity to stabilize the route structure of the U.S. flag airlines in the trans-Pacific region at renewal time for the separate carriers involved.

—Selig Altschul

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You might think "K"® Monel was specially alloyed for the aviation industry. For what other metal has so many of the properties required by aircraft engineering:

- **Age-hardenable to high strength and toughness**
- **Highly resistant to corrosion**
- **Non-magnetic**
- **Heat resistant**
- **Resistant to sub-zero cold**
- **Easily welded**

Here's an alloy you can really put to work — a corrosion-resisting wrought alloy of nickel, copper and aluminum. It offers you the excellent corrosion resistance of regular Monel®, together with the added advantages of greater strength and hardness.

Both of these added advantages are vitally necessary, for example, in an arresting hook because it is subject to violent shocks and stresses. But the hook on Grumman's radar-equipped anti-sub plane, the AF-2W shown above, also had to be made of a non-magnetic alloy.

So "K" Monel was a natural choice for the job — as it might well turn out to be for some job of yours that calls for an alloy with a hard-to-find combination of properties.

Suppose we take a quick look at a few of the principal characteristics of "K" Monel:

Age-hardenable, or capable of having its hardness and mechanical properties increased simultaneously as the result of thermal treatment, "K" Monel is equal in strength and toughness to many heat-treated alloy steels. It shows *improved* strength and hardness at sub-zero temperatures with no loss of toughness. And it provides moderate strength at temperatures up to 900°F.

"K" Monel is non-magnetic under ordinary conditions, and remains so down to −150°F. It finds many uses in compasses and sensitive electromagnetic equipment, or where non-magnetic structural members must be placed close to them.

The working characteristics of "K" Monel are excellent, too. It is readily machined in an annealed condition, but in other conditions may be considered commercially machinable at practical (although generally somewhat slower) rates. It can be joined by the usual welding, brazing and soldering processes.

You'll find all essential engineering data on "K" Monel and its more machinable companion alloy, "KR"® Monel, in the 24-page reference manual, "Engineering Properties of 'K' Monel and 'KR' Monel." Write for your copy.

One last — and important — point. "K" Monel, like other nickel alloys, is now on extended delivery because of defense needs. So it is important to include NPA rating and complete end-use information with all orders.

The Magnetic Characteristics of "K" Monel[1]

Condition	Tensile Strength psi.	Permeability at Room Temperature (H. 200 Oersteds)	Curie Temperature, °F., for Permeability of			
			1.01	1.02	1.05	1.1
Annealed, quenched	92,500	1.0011	below −210	below −210		
Annealed, age-hardened	151,000	1.0018	−153	−178	−202	−210
Cold-drawn, 20%	137,000	1.0011	below −210			
Cold-drawn, 20%, age-hardened	186,500	1.0019	−130	−150	−182	−210
Cold-drawn, 50%	151,250	1.0010	below −210			
Cold-drawn, 50%, age-hardened	198,000	1.0019	−130	−150	−182	−210

[1] Bureau of Standards, Washington, D. C. 1941

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New Airline Boom in Flight Simulators

- **Curtiss-Wright session draws big attendance.**
- **Link and C-W optimistic on near-future orders.**

By Philip Klass

Airline interest in flight simulators is growing, spurred by a recent Curtiss-Wright-sponsored symposium and by the President's Airport Commission report which urged their use to improve airline safety. Here's some evidence of that growing interest:

• **Twelve airlines** sent representatives to the Curtiss-Wright flight simulator symposium: United, American, Eastern, TWA, Capital, Northwest, National, Panagra, Colonial, KLM, Argentine and Pan American Airways.

• **Curtiss-Wright** and United Air Lines discussions have advanced to the point where joint specs for a DC-6B and a Convair 340 simulator have been prepared.

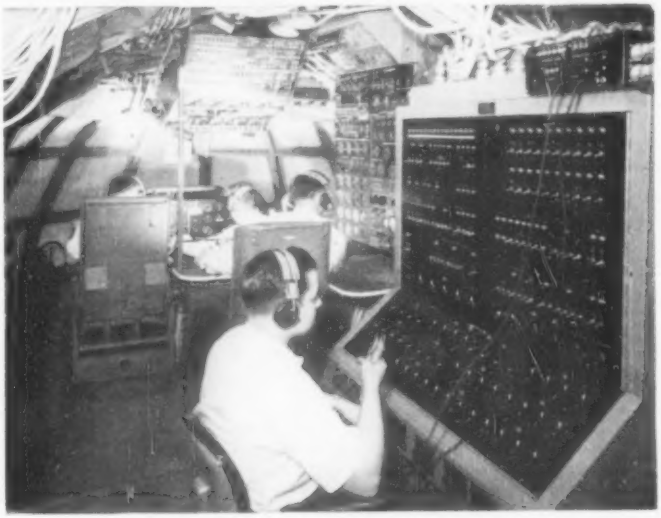
• **C-W's Ward Davis,** sales manager for the company's electronics division, says that C-W hopes to have airline orders for "eight or nine simulators within 90 days."

• **Link Aviation** reports visits from "several airlines" and discussions with airline representatives.

▶**Curtiss-Wright Symposium**—An airline that buys a multi-engine aircraft flight simulator can amortize its cost and have a tidy additional saving after five years by cutting down expensive aircraft flight time now spent in crew proficiency checks, a C-W spokesman told airline representatives at the Carlstadt, N. J., symposium. This is based on reducing a captain's yearly 3¼ hr. instrument-check flight time to 1 hr. and supplementing it with 8 hr. in a flight simulator. Comparable savings result for simulator check-out of first officers.

The symposium stressed the simulator's ability to subject flight crews to emergency conditions. Some conditions, such as an engine fire, can't be duplicated in a training flight; others would risk loss of crew and a million-dollar airplane if attempted in the air.

▶**PAA Confirms**—Airline representatives didn't have to take Curtiss-Wright's word for simulator benefits. "You can see the difference in flight crews," Paul Pritzlaff, chief flight instructor for PAA said in describing his airline's experience with the Boeing 377 (Stratocruiser) simulator which it bought from C-W in 1948.



SIMULATORS, like this C-97A model, faithfully reproduce actual plane performance.

"The crews with simulator experience are more orderly under emergency conditions. They feel more at home, and there is better crew coordination," Pritzlaff said in praising the use of simulators. PAA is the only U.S. airline which has a multi-engine simulator, although BOAC recently purchased a Stratocruiser simulator from a British licensee of Curtiss-Wright, Redifon, Ltd. Redifon is now constructing a DH Comet simulator for BOAC.

Using a C-97A simulator which C-W was readying for delivery to the USAF, an Air Force crew demonstrated the "coordination," to which Pritzlaff referred, in handling an engine failure on takeoff and other emergency conditions.

▶**PAA Experience**—In training new Stratocruiser flight crews, Pan American says it has cut transition flight time from 21 to 8 hr. by using its flight simulator. PAA has now racked up 15,050 hr. of simulator use in training 125 PAA and 40 BOAC Stratocruiser crews and 130 Military Air Transport Service C-97 flight crews.

With Civil Aeronautics Administration approval, PAA has cut its semi-annual in-flight instrument proficiency check time from 1½ hr. to ¾ hr., supplemented by several hours of simulator time, according to Pritzlaff.

Pritzlaff said that PAA's simulator has averaged 15.3 hr. use per day and he estimated it has been out of service because of malfunctions less than 1/10 of 1% of the time. Two electricians handled the necessary simulator maintenance in addition to their similar duties on other instrument trainers. Electronics specialists are not needed for maintenance of simulators, Pritzlaff emphasized.

▶**Simulator Economics**—Based on rough estimates by both Curtiss-Wright and Link Aviation officials, the first model of a new 4-engine aircraft flight simulator will cost almost as much as the airplane itself—slightly over a million dollars. Additional copies of the simulator would run in the neighborhood of half a million dollars.

When it comes to hourly operating costs, the simulator is considerably more economical than the airplane for training purposes. C-W says its simulator costs about $30/hr. to operate, including maintenance, one operator and two instructors. Pritzlaff cited a PAA estimate of $35-40/hr. This compares with $350/hr. for operating a DC-6 or L-1049 Constellation, C-W says.

This comparison doesn't take into

Similarity of Simulators

The Curtiss-Wright-Dehmel C-97A flight simulator and Link Aviation's B-47B simulator (AVIATION WEEK, June 16, 1952; p. 65) use fundamentally the same approach. Both are electro-mechanical analogue computers. They use non-linear potentiometers and summing amplifiers and integrating servo systems operating on 60 cycle a-c, except for signal circuits to panel instruments, some of which operate on 400 cycle a-c.

Evidence of the fundamental similarity is C-W's statement that it has given notice to Link, Westinghouse Air Brake and other simulator manufacturers of possible infringement on what C-W says are basic patents held by their Dr. R. C. Dehmel.

▶**Piston Aircraft More Difficult**—It is somewhat more difficult to simulate the complete performance of piston engine aircraft than jets. A Link Aviation spokesman readily confirms this C-W statement. There are more variables, such as propeller pitch, turbosupercharger waste-gate setting, water injection, etc. which affect airplane performance.

C-W says that the C-97A simulator incorporates new features not contained in the unit which Pan American Airways purchased in 1948. Whereas the PAA unit experiences fuel depletion at a constant rate, the C-97A simulator varies the fuel depletion readings according to flight conditions. In addition, anti-icing, fire extinguisher and similar controls have been made fully functional in the new units.

▶**C-W-Link Comparison**—C-W has chosen to house its analogue computer circuits in vertical cubicles separately from the simulator cabin unit; Link clusters its electronic gear around the simulator to form an integral unit. However, the Link simulator breaks down into convenient sub-assemblies for shipping purposes.

C-W groups all the computers and amplifiers for aerodynamic simulation in one cubicle; the equipment to simulate all functions for two engines is housed in another cubicle; the other two engines in a third cubicle. A fourth cubicle houses the equipment which provides audio simulation.

Within a single cubicle, C-W locates all servo amplifiers together on one rack; all servo motors together on another rack. Link, on the other hand, groups the amplifiers, servo motors, and all other items for a particular function (such as angle-of-attack, airspeed, etc.) together on a single draw-out rack.

▶**Standardization**—For the past year, C-W has gone through a program of standardization in order to provide a minimum number of "building blocks" from which future types of simulators can be constructed. Both C-W and Link obviously have given considerable attention to standardization and to a layout designed to permit easy maintenance. To this writer, Link appears to have the slight edge, particularly with their erector-set type of construction.

On the other hand, C-W appears to have a decided edge in simulating flight and landing sounds. Link feeds the B-47B engine sound into the pilot's headsets; C-W uses two loud speakers in the cabin, one on either side of the crew. Engine sounds are piped through the appropriate speaker to give them "direction."

C-W generates its engine and windstream sound effects by means of four tone-wheels revolving between their individual photo-cells (two for each) and its light source. By this means they create realistic engine sounds, including "beat" when the engines are not properly synchronized. C-W also provides a very realistic "tire squeal" on touchdown. This sound is generated by means of a condenser discharge circuit.

Dr. Dehmel says that C-W has provided completely automatic operation of radio and navigation aids in order to give flight realism.

account possible passenger revenue lost when a plane is being used for training purposes. C-W places the gross revenue potential of a DC-6 or Constellation at $1500/hr.

C-W therefore estimates that an airline with 100 DC-6 or Constellation crews could pay for its flight simulator and have almost $400,000 "in the bank" at the end of five years. If the increased airplane availability is put to passenger use, C-W estimates the airline could be an additional $2.8 million ahead after five years.

Based on its economic analysis, C-W says that a minimum of 35 flight crews (for one type aircraft) is necessary if the simulator is to pay its own way economically. Smaller airlines might share a single simulator or rent simulator time from a company set up to provide such service. At present, C-W doesn't plan to rent out simulators.

CAA interest is evidenced by its purchase of an Air Force C-97A simulator for familiarization of CAA personnel.

Colonial Stands Pat On Merger Views

Colonial Airlines merger choice still will depend mainly on who bids the highest price, President Branch Dykes writes Civil Aeronautics Board Chairman Donald Nyrop. CAB recently chastised Colonial for putting itself "on the auction block" and being "more interested in the purchase price of a sale . . . than . . . in . . . aspects of the public interest. . . ."

Eastern's recent bid looks best on the basis of Colonial's intention reiterated in its new letter to CAB—"That Colonial's management will do all within its power to live up to its fiduciary responsibility to its stockholders. . . ." The new Eastern bid is two shares Eastern in exchange for three Colonial.

The National Airlines offer (which may since have been increased to meet Eastern's) was one $11-par 4½% convertible National debenture for one share of Colonial common. Conversion would be at 2½ debentures for one common share.

▶**Offers**—But National also offered to meet Eastern's bid; it is not known yet what NAL and Eastern have done in the way of counter-bidding.

The Northeast Airlines offer was for a straight stock transfer in the ratio of the two companies' book values on transfer date.

Nyrop complicated Colonial's immediate merger outlook, Colonial officers say, when he wrote a letter hinting broadly that the Board would probably prefer Colonial marriage with National over Eastern (AVIATION WEEK June 23, p. 75). And Nyrop said price of the exchange will depend on the Board, regardless of bid—since CAB would cut down "an excessive purchase price."

New Charter Line

(*McGraw-Hill World News*)

Rome—A new Italian charter airline has been organized in Milan to carry freight and passengers. Initial service was hauling of nearly three tons of antibiotics from Milan to Hong Kong. The new carrier, Societa ItalianaTransporti Aerei is using two trimotor Fiat G. 212s purchased from Ali-Flotte Riunite.

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M-Day DATA Plans

Here is the new Defense Air Transport Administration program now submitted to Military Air Transport Service to meet its mobilization-day requirements for civil transport contribution (compared with the original plan, which would give about the same lift capacity):

	New Plan	Old Plan
DC-4	130	182
DC-6	80	88
Connie	60	57
B-377	25	35
Total	295	362

Initial Airliner Modification Plan for Mobilization

Here are the airline contributions planned for the initial Air Force modification contracts readying them for overseas mobilization for 48-hr. readiness for war (contracts may be signed by the end of this month):

Airline	Type Plane	Number
American	DC-6	22
Braniff	DC-6	3
Capital	Connie	2
C&S	Connie	2
Delta		
Eastern	Connie	8
National	DC-6	2
Northwest	B-377	2
Panagra	DC-6	2
PanAm	B-377	3
TWA	Connie	18
United	DC-6	11
Slick	DC-6	3

MATS Gets Airliner Draft Plan

Defense Air Transport Administration has firmed up its plan for mobilizing part of the airline fleet in case of all-out war.

Latest version, submitted to MATS for approval last week, calls for modification of 295 of the airlines' 600 four-engine planes—to be ready for mobilization on 48 hours' notice. MATS' approval is expected; it's airlift potential that MATS cares about most—not which planes accomplish it.

The 295 planes include virtually all of the airlines' cargo planes; but passenger versions will have to do a major portion of the work. There aren't many specialized four-engine cargo planes in certificated airlines' fleets. The passenger planes will be able to carry freight that does not have too concentrated a load.

► **Decisions Pending**—Airlines and government have not been able to decide just who will contribute how many of what type plane—and Air Force has had trouble deciding whether it wants medium-range DC-4s. Result is that even now there are only about 78 planes definitely earmarked for modification although the mobilization planning idea is two years old.

Aside from delays in deciding what type planes are needed, there have been knotty negotiations as to which airlines shall contribute them. It has been planned that planes would mostly be drawn from the airlines that had equipment most easily transferrable to over-water military work. But now, with fleets growing so fast, most airlines have decided they can meet their quotas in direct proportion to their size. A few, with short-range fleets, are reaching into 1953 delivery schedules to make up their promised proportional contribution.

► **All-Out War**—Air Force has continued to talk only of readying less than half the airlines' four-engine fleet. But a top DATA official, and a MATS spokesman, say that almost all four-engine planes may be mobilized in an all-out war. One responsible official says he cannot understand why Air Force continues to mention only the less-than-half-way planning now under negotiation.

Probably it is because the smaller contribution is easier agreed to; once it's planned, the formula can be expanded to cover any number of planes if the emergency requires.

If Defense Air Transport Administration (organized within the Commerce Department primarily) disagrees at some future day with what the Air Force asks, the deciding agency is Office of Defense Mobilization. So far, however, all activity has been voluntary.

Aircraft Heads Set To Fight Menzies

(McGraw-Hill World News)

Melbourne—Leaders of Australia's aircraft industry are mobilizing to fight the Prime Minister's expected proposal to stop building warplanes here.

On his recent mission to the U. S. and Britain, Prime Minister Robert G. Menzies sought promises of quick delivery to Australia of large numbers of modern warplanes. As a result of his trip, he's expected to ask that Australia stop building military planes.

Government leaders are trying to persuade aviation industry chiefs that this action would not hurt them since they would be allowed to produce training planes, jet engines and spare parts.

But the industry plans to put up stiff opposition. They will argue that neither the U. S. nor Britain can afford to export large numbers of aircraft to Australia.

Socialist opposition will support the aircraft industry. It is understood that Labor Party leaders would press for major increases in aircraft production capacity if and when re-elected to power.

Contractor Charges He Went on Rocks

A Bloomington, Ind., contractor and two bonding houses are suing the U. S. Government for $500,000 charging that erroneous specifications issued concerning the site of Zanesville, Ohio, Municipal Airport did not reveal the presence of large quantities of rock and shale at the field. Construction was during 1943 and 1944.

Contractor N. E. Daugherty alleges, that on the basis of the specifications issued, he believed that there were no more than 100 cu. yd. of rock. Actually, the suit charges, there were 233,000 cu. yd., also 423,168 cu. yd. of hard shale.

The project's specs were prepared by Civil Aeronautics Administration.

The contractor has submitted as evidence samples of the material encountered, which have been stored since 1944 in a Zanesville bank.

Australian Fuel Prices Rising

(McGraw-Hill World News)

Melbourne—Another jump in prices of aviation fuel appears to be imminent here, and apparently increases in air fares and air cargo charges will follow. This is despite recent recessions in passenger and air freight bookings.

New price for 91 octane fuel is expected to be 55 cents per imperial gallon, with 100 octane seen going to nearly 70 cents. Australian's major carriers, Trans-Australia Airlines and Australian National Airways, see their costs going up another $3.5 million as a result of the new prices, with other items rising too.

EAA Stock Plan Is Oversubscribed

European American Airlines, applicant for a non-subsidized trans-Atlantic route somewhat similar to domestic certificates of the Slick Airways and Flying Tiger Line, reports the $200,000 private stock part of its financing has been oversubscribed at $7.50 a share.

Subscriptions are contingent on winning certification. This must come from Civil Aeronautics Board or the President. Underwriting agreement, signed by Gearhart, Kennard & Otis, would raise another $400,000 equity, plus equipment trust financing of about another $2 million to cover 80-90% of two DC-6As or Super Constellations.

Additional equity financing is planned through a DC-4 lease deal with Ocean Air Tradeways.

New Jap Airline Takes First Steps

Japan has taken initial steps to get into the international airline operations picture with signing of ten-year contract recently by California Eastern Airways and Yeitaro Okada in San Francisco.

Okada represents the newly organized Japan International World Airways which has ambitious plans. It hopes to start scheduled flights by the end of the year over a 13,500-mi. route using DC-4s. The route would serve Tokyo, San Francisco-Oakland, Rio de Janeiro and Sao Paulo, Brazil.

California Eastern's role will be to supply equipment and personnel; under the terms of its contract it has an option to become one-third owner of the Japanese firm. Early ratification of the agreement in Japan is expected.

California Eastern is making some organizational changes in view of this new development. It plans to move its New York headquarters to its operational quarters in Oakland, Calif. F. W. Caton, vice president-flight operations, will go to Tokyo.

Complaint Center Has Busy Week

The staff of the National Air Transport Coordinating Committee's newly opened complaint center at 270 Park Ave., N.Y.C., returned to work on July 7 after a long weekend to find a backlog of several hundred protests to be cleaned up concerning "low flying and noisy airline planes."

It marked an auspicious first week for the center, which opened June 30. Staffed by approximately a half-dozen people from the airlines, CAA and Port of New York Authority, this experimental station will answer all calls from irate residents of nearby air terminals, attempt to obtain identification of the offender for forwarding to the carrier concerned, and explain problems involved. It also will work up plots to try to lessen the offenses.

A spokesman for the center remarked

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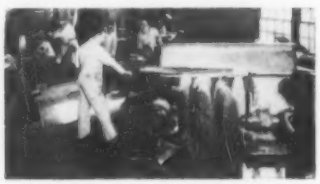

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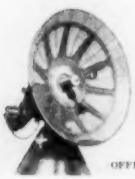

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that thus far its work has made a good impression on the public. As yet there are no plans to extend the operation to other cities. The center operates Mondays through Fridays from 8:30 a.m. to 5:30 p.m. Calls over weekends are handled by an answering service for followup at the first opportunity.

As a result of information thus far compiled, the airlines now are working out standardization of pilot technique in use of power and pitch changes during landings and takeoffs to bring noise levels down to a minimum. Idlewild, a big maintenance base, has the added noise feature attendant to engine run-ups during tests, a problem also under study.

TACA Steps Up DC-4 Service

By substituting 44-passenger DC-4s for virtually all present DC-3 service, TACA International Airlines is stepping up its coverage of Central American traffic from New Orleans and Mexico City.

Effective July 14 the carrier will inaugurate five times weekly DC-4 service to Guatemala City, San Salvador, Tegucigalpa and Managua from New Orleans and Mexico City. Mexico City schedule is also being revised to receive DC-4 service permitting better connections there, to and from Tijuana and all western U. S. cities. DC-3 service will be used on the connecting flights between Managua and San Jose.

Last year TACA International flew 15,439,900 passenger miles with no accidents or fatalities, and recently received the annual aviation safety award from Inter-American Safety Council.

DC-6 Skin Check

Two National Airlines DC-6s hit such turbulence associated with the same storm that both sustained considerable wing skin damage.

As a result, Douglas Aircraft and CAA sent out special bulletins to all DC-6 operators this month instructing them to make frequent checks of the affected parts. The CAA letter also urged that pilots hitting unusual turbulence report it to ground crews.

Low-Cost Tours

(*McGraw-Hill World News*)

Amsterdam—A complete low-cost tour of Europe using Dutch transport throughout and payable in America, is being planned for the "average" U.S. traveler. Cooperating are KLM Royal Dutch Airlines, the Holland-Amerika Line and ten leading Dutch touring car firms.

Israel Establishes Domestic Airline

Israel now has a domestic airline.

Starting in a small way, the carrier, named Arkia (meaning "The Skies" in Hebrew), flies one scheduled flight daily from Lydda to Eilath, a port on the Red Sea (Gulf of Aqaba). Cargo flights are flown on demand, which means daily, V. L. G. Gore, Israeli Director of Civil Aviation, said during a recent visit to U. S. Cargo runs the gamut from beer for troops to building material.

The airline now operates four C-46s. Gore predicts that Arkia will develop rapidly into a large and bustling airline because of the great amount of internal circulation in the new country relatively undeveloped, slow railroad system and overloaded buses. What the country needs, he feels, is a high-frequency, low-cost airline operation capable of mass transportation.

Israel is fairly well supplied with airfields, according to Gore, and a new one will soon be built at Jerusalem, currently airportless. Lydda Airport is being enlarged and modernized he added.

Gore would not speculate on what type or how much new equipment Arkia will acquire as expansion goes forward.

Passage to Alaska Enjoying Boom

Peak season airline traffic between Seattle and Alaska has boomed to an all-time high with heavy movements likely to run for several months. Traditionally large load factors at this time of the year were boosted still higher because of a shipping strike.

During June four scheduled airlines flew approximately 16,500 passengers compared with 10,640 carried the previous month. Breakdown by carrier: PAA flew nearly half the June figure, NWA nearly 5,000 including passengers to the Orient, Pacific Northern about 2,200 and Alaska Airlines less than 1,000. The latter reputedly was grounded five days.

Cannery employes seasonally account for a large part of the bookings—some 10,000 move up the Pacific Coast into the territory for this work from February to July. The shipping strike threw a considerable extra burden upon the carriers: Alaska Steamship Co. referred 300 passengers to PAA alone. The carriers can have all the cargo they can carry. But passengers are given first priority with any room left over used for freight. PAA and NWA each operate an all-cargo plane to help move the load.

Nonskeds are almost completely out of the picture in this area, due mostly to

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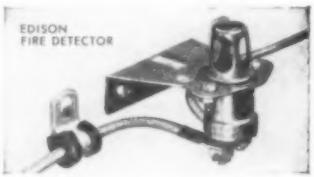

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government regulation and the fact that the unions have switched their business to the scheduled carriers. But the non-skeds are believed to be moving most of the cannery workers up the coast from the San Francisco Bay region to Seattle.

PAL Starts Family Fares

(McGraw-Hill World News)

Manila—Philippine Air Lines inaugurated family fare plan beginning July 1 on its domestic services valid during Tuesdays, Wednesdays and Thursdays to Oct. 30.

Only the head of the family pays full adult fare, with children from 12 to 21 years old paying half adult fare. If both parents make the trip with the group, only one pays full fare. Children between the ages 2 to 12 will continue to be charged half fare.

Travel Agents Policed

(McGraw-Hill World News)

Buenos Aires—All persons engaged in promotion or sales of tickets or cargo space on any kind of public transport have been placed under jurisdiction of the Ministry of Transport, which will draw up detailed rulings.

Big ICAO Meet For Australia

(McGraw-Hill World News)

Melbourne—Thirty nations are expected to meet in this city late this year in the biggest civil aviation meeting ever held in the area. It will mark the first time the Southeast Asia and South Pacific regions will combine for a single conference, which is slated to last three weeks, under International Civil Aviation Organization auspices.

Aviation facilities, procedures and standards to be implemented in these regions will be discussed. South Africa is included in the roster because of the Indian Ocean air route Qantas Empire Airways has scheduled.

Accident Board

(McGraw-Hill World News)

Buenos Aires—Argentine has set up an air accident investigating committee following recommendations of International Civil Aviation Organization. The group, formed by the Sub-Secretary of Civil Aviation, is named the Consulting Board on Aviation Accidents.

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Aid or Trade?
A CRISIS AHEAD

A crisis in the foreign trade relations of the United States is in the offing. It is a crisis caused by:

1. Efforts of producers in friendly nations to earn more dollars by increasing exports to the United States, and
2. Efforts of industries in the United States which would be hurt by competition from these imports to keep them out.

This crisis is a threat to the effectiveness of American leadership in the crucial effort to build the nations of the free world into a strong and unified group. It is the purpose of this editorial to advocate a constructive approach to the difficult situation that is developing.

Background of the Crisis

Most countries in the free world – with American aid – have managed to push their outputs well above prewar levels. As they have done so, they have been urged by our highest government officials to increase their exports to us. Sales in our market enable these countries to earn dollars which they use in turn to buy the products of America's farms and factories. Thus, as they become self-supporting, the need of American aid is reduced.

But as these efforts to export more to the United States have promised increasing success, competitive American producers have become increasingly alarmed about what that success might do to them. Consequently, they are seeking more protection – by appeals to the U. S. Tariff Commission to recommend higher import duties and by appeals to Congress for new laws to discourage imports.

Our Friends Protest

A year ago Congress answered one of these appeals by imposing a quota on imports of dairy products. Now, among many other legislative proposals being strenuously pressed is a move to extend the scope of "Buy American" legislation. A year ago the U. S. Tariff Commission had only four petitions for increased import duties on its docket. Since then fourteen more petitions have been filed and others are definitely on the way.

Faced by these mounting efforts to block the sale of their products in the American market, no less than eleven friendly nations, including Great Britain, France, Italy, Canada, the Netherlands, Switzerland and Denmark, have filed protests with our State Department. Through many of the protests runs one refrain. Although stated in diplomatic language, it might be correctly paraphrased to say: "*In*

sending us aid you have made it very clear that you want us to get on a self-supporting basis at the earliest possible moment. But, when we begin to make headway in that direction by trying to sell you more of the things we are equipped to produce, you start closing your market to us." The threat of European resentment against the United States being stirred up by this argument is obviously great.

At the same time there exist grounds for special resentment in the United States against certain prospective imports of European manufactured goods – those of machine tools, for example. In part these will be produced with machinery that has been sent to Europe as part of our economic aid program. With absolutely no diplomatic language involved, the argument, which will be extended much farther than the facts would justify, will run: "*We gave those people the equipment that they now use to cut our throats!*" This line of argument will find response among workers as well as employers in industries faced by more competition from imports. Labor, too, is keen for protection against more foreign competition.

Aid or Trade?

As between continuing direct economic aid to Europe or accepting the imports that would make those countries self-supporting, some would prefer to continue the aid program. They argue that the tax machinery of the federal government can spread the burden of aid broadly, while we have no comparable machinery that can cushion the shock to individual industries, firms and communities that may result from stepped-up imports of competitive products.

As we see it, this position is untenable. It would make rubbish of our Atlantic Charter promise ". . . to further the enjoyment by all States, great or small, victor or vanquished, of access, on equal terms, to the trade and to the raw materials of the world which are needed for their economic prosperity." It would be an admission that, for all our profession of faith in competition and our opposition to European cartels, we really don't believe in competition.

U. S. Self-Interest

The people of this country have invested billions of dollars and seven years of hard work in the attempt to put our allies on a self-supporting basis. If we keep their goods out by raising trade barriers, we are directly defeating our own purposes.

Also, in moving to protect some groups of American producers we should be hurting others. For many American producers the export market, which this year will take about $14 billion of civilian goods, spells the difference between operating at capacity and closing down 25% of their facilities. When we discourage imports we cut off dollar earnings by other nations which are spent here to keep some of our factories and farms going.

At the same time, it must be recognized that certain American industries and their capacity to maintain employment will be hurt by increased imports. Hence it becomes critically important for the United States to formulate a national program designed to help these industries and communities take up the shock.

There is no neat and simple prescription by which this can be done, but several possibilities have been suggested. One on which there is general agreement is that tariff reductions should be gradual. To cushion their impact, the government might well give preference on defense orders to industries and areas adversely affected by an increased volume of imports. Direct assistance to workers and companies in shifting to different lines of business may be worth consideration.

These are by no means all the possibilities. They may not even be the best. But they do serve to suggest the necessity for flexibility and imagination in dealing with the growing crisis in trade relations. *Our ingenuity in developing new ideas to meet this crisis may well be a decisive factor in our effort to weld the free nations into a strong and durable alliance.*

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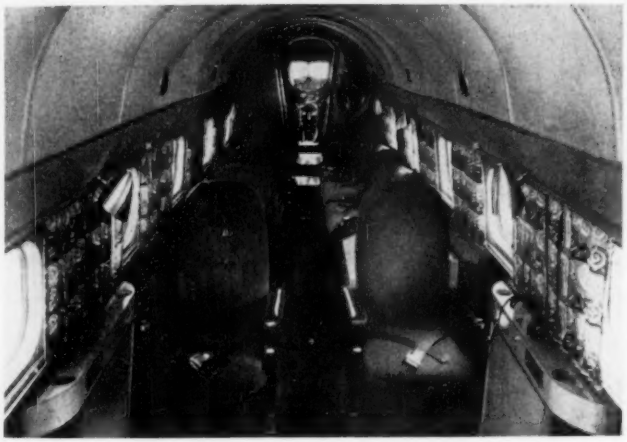

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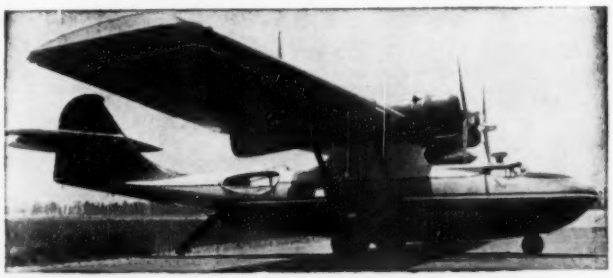

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78	76236	Gear
1178	84289	Bearing
113	84487	Housing
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550	TFD 8600	Thompson	Fuel Booster Pump
125	D7818	Adel	Anti-icer Pump
250	AN4014	Erie Meter	Wobble (D-3) Pump
300	1H260-K & KA	Pesco	Hydraulic Pump
1000	AN5780-2	G. E.	Wheel & Flap Position Indicator
400	AN5780-2	Weston	Wheel & Flap Position Indicator
44	SBA25DJ4B	G. E.	DC Motor (½ HP)
50	RDB2220	Holtzer Cabot	DC Motor
115	P4CA2A	Parker	Primer
70	AN3213-1	Scintilla	Ignition Switch
450	A-9 (94-32226)	Nesco	Ignition Switch
687	RS-2	Mallory	Selector Box
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492	S-841 (94-32253)	Electronic Labs	Box
53	AN6203-3	Bendix	Accumulator 10"-1500 P.S.I.
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188	EYLC-2334	Barber-Colman	Control
11	12086-1C	Eclipse	Amplifier
174	450-0	Skinner	Gasoline Filter
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100	716-3A	Eclipse	Generator (NEA-3A)
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SHORTLINES

▶ **Aer Lingus,** despite recent purchase of four 40-seat Bristol Wayfarers, has had to hire a DC-3 and a Vickers Viking to take care of summer peak travel.

▶ **Air Transport Assn.** reports scheduled airline letter and card mail volume increased 27% to over 1 billion items last year. Railroad card and mail carriage gained 5% to 16½ billion.

▶ **Braniff Airways** is selling its 12 DC-3s for $65,000 each plus value of pre-overhaul time left on airframe and engines, at $2.50 per hour per engine hour and $2.50 per airframe hour, up to 1,000 hours. BNF has 20 Convairs 340s on order.

▶ **British Overseas Airways Corp.** has sent eight top operations officials to Miami and New York to study Pan American World Airways' methods.

▶ **Civil Aeronautics Administration** figures show there were 1,404 regular transports in U. S. public air transport operation as of June 1—166 DC-6 type, 245 DC-4, 492 DC-3, 127 Constellation, 68 Martin, 45 Stratocruiser, 115 Convair and 146 C-46. . . . CAA has issued the first of an airworthiness directives series. Initially covered are the Constellation, Stratocruiser, and Martin 2-0-2; changes required on DC-6 and American Airlines' Convairs will be more comprehensive.

▶ **Colonial Airlines** stockholder committee chairman Peter Ansberry urges the airline to accept Eastern's merger bid: "at the present market price of Eastern common, this amounts to $16.50 per Colonial share"—about one-third more than National's formal bid. . . . Company reports June was its second highest month on record, with 4,600 passengers carried on the Bermuda run and 25,000 domestically.

▶ **Empire Airlines'** certificate has been renewed and its merger with West Coast Airlines approved by CAB. Empire renewal is to Sept. 30, 1954. Labor protective conditions must be the same as in the Braniff-Mid-Continent merger case.

▶ **Flying Tiger Line** cannot handle passenger charter business except by special exemption, CAB has ruled, because the Tiger certificate is for freight business only. . . . Company's 784,027 outstanding shares common stock has qualified for listing on the N. Y. Curb Exchange, with ticker symbol "Fly." . . . An additional 500,000 shares over the original million were authorized last year. This and the curb listing are part of the build-up for financing delivery of seven DC-6As next year.

▶ **North American Airlines,** largest domestic nonscheduled airline, has bought a fifth DC-4 and is negotiating to buy either four Douglas DC-6As or four Lockheed Super Constellations. . . . Company missed out to Transocean Airlines in negotiations to buy Slick Airways' prototype DC-6A, for which Transocean is paying $1,200,000.

▶ **Pioneer Air Lines** business gained 19% over a year ago to 13,903 passengers carried last month—first month of Martin 2-0-2 operation. The Martin load factor was 44%, or 16 passengers. Martins flew 40% of the scheduled mileage and DC-3s the rest—for the last time. By June 30, all Pioneer flights were by 2-0-2.

▶ **Pan American World Airways'** three DC-6As will have payload capacity of 25,000 lb. despite the length of its trans-Atlantic haul.

▶ **Phoenix Sky Harbor Airport** runway extension will cost $1,081,000 including 1,800 ft. paved increase plus $1,200 cleared overrun area.

▶ **Silver City Airways,** cross-Channel car ferry operator, has set a mark of 10,000 flights in four years without accident. Silver City has flown more than 24,000 vehicles across the English Channel, half of them in the past year.

▶ **Slick Airways** is negotiating sale of its prototype DC-6A. Transocean and North American are leading bidders.

▶ **TPA Aloha Airline** June traffic of 16,871 passengers was up 20% from a year ago.

▶ **Trans World Airlines** and Mid-Continent have signed an agreement for one-plane service Minneapolis-Los Angeles-San Francisco via equipment interchange at Kansas City, using TWA Constellations.

▶ **U. S. domestic airlines** fatality rate July 1951-June 1952 was .79 per 100 million passenger miles.

▶ **United Air Lines** is placing four new flight information centers in operation this month in Chicago, New York, San Francisco and Los Angeles. Manned "round-the-clock" by specially trained agents, the centers serve as clearing houses for flight information from all fields used by UAL in these metropolitan areas. Separate phones, apart from regular sales and reservations wires are used.

STRICTLY PERSONAL

Robert B. Hotz (above) will return to the staff of AVIATION WEEK Aug. 1, after an absence of two and a half years, to fill the newly created position of executive editor.

He will be stationed in Washington and his duties will include direction of AVIATION WEEK's Washington office. He will work with Alexander McSurely and other staff members to broaden further this magazine's coverage of the Capital scene.

Bob Hotz has had long experience in aviation and aviation writing. He was news editor of AVIATION WEEK from its beginning in 1947 until the end of 1949 and before that of Aviation News, this publication's predecessor, from the time he left the Air Force in 1946.

He has been public relations manager for Pratt & Whitney Aircraft, East Hartford, Conn., since leaving AVIATION WEEK.

A native of Milwaukee, where he learned to fly in 1939, Hotz worked on the Milwaukee Journal and was its New York correspondent. He was reporter and editor on the Paris Edition of the New York Herald Tribune and foreign correspondent in Asia for the Toronto Star.

Hotz became assistant editor of Air Force magazine when it was organized in 1942, and during a tour of Korea in 1951-52 served as its war correspondent. His "Jet War in MiG Alley" has been widely reprinted throughout the world. He was one of the first war correspondents to fly the Alley with USAF Sabre jets.

Hotz served four and a half years in the Air Force during World War II, advancing from second lieutenant to major. He was awarded the Air Medal with oak leaf cluster for combat operations in China. He served two years on the staff of Maj. Gen. C. L. Chennault, commander of the 14th Air Force in China, and was ATC liaison officer with the Intercontinental division of TWA.

He is author of the book "With General Chennault—the Story of the Flying Tigers" and edited "Way of a Fighter," the general's memoirs. He co-authored "The Pratt & Whitney Aircraft Story," and helped produce AF documentary film, "China Crisis."

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LETTERS

Crash Fire Tests

Strictly in the interests of fair play, I feel constrained to point out an apparent discrepancy in an item in "So They Tell Us" column in AVIATION WEEK June 2, concerning the NACA crash fire tests.

The implication is that the results of these tests are being kept secret from the civil aviation industry. I can bear personal witness that such an implication is unwarranted. As an engineer at Eastern Air Lines, Inc., I was enabled on May 16, 1952, to make arrangements for a lecture by Mr. Irving Pinkel of the NACA on the subject of these fire tests . . . . an interesting two-hour presentation.

Everyone in the airlines in the Miami area who we felt might be interested was invited. Airline personnel from as far away as Atlanta attended. This showing was announced by telegrams or letters to the various airlines from the CAA, by me personally via telephone to the local airlines, and by means of ATA Engineering Memorandum #52-39. Incidentally, this ATA Memorandum also announced similar lectures for the New York, Washington, and Cleveland areas.

The last clause in your item is completely accurate as a number of lessons or indications important to civil aviation were brought out. These affect design items in future aircraft, possible modifications to existing aircraft, and procedures affecting survival before, during, and after landing or take-off crashes.

Incidentally, the only restriction noted in the meeting was the requirement that each person sign an attendance list stating his American citizenship. May I congratulate you otherwise on your excellent magazine.

MR. G. E. HANFF,
Project Engineer
Eastern Air Lines, Inc.
Miami International Airport
Branch P. O. Box 787
Miami 48, Florida

Saving New Ideas

The questions raised in your editorial, "Saving New Ideas," June 2, should receive intelligent consideration by leaders in government and industry.

Like yourself, I am alarmed at the disinterest in encouraging new ideas which has been generally exhibited by top men. Invariably, the worst offenders are among the first to deny such a charge by proclaiming with great pride and finality, "We have a suggestion system and a fine Research and Development Department. What more can we do?"

Frankly, there is plenty more that can be done! Ask anyone in the lower echelon who has submitted a suggestion or idea, and invariably you will find that they encountered an atmosphere which stultified further effort.

What is needed is some way to encourage people to give ideas. Lately, I have been trying to promote a plan which is simple and tremendously effective. This plan merely consists of establishing "Idea-Buyers", men whose sole purpose is to go forth as representatives of top management and "buy" ideas, not with money but by giving the most important thing to all of us—personal recognition.

The average person is not a salesman, nor is he sufficiently adept with words to convey a clear and concise picture of his ideas. The "Idea-Buyer", on the other hand, knows how management wants ideas presented and to whom they should be presented. Thus, by having a better overall picture of the situation, the "Idea-Buyer" can at the proper time present new ideas in their most favorable light.

The nearest approach to the system which I have described was the establishment of the Inventor's Council during the war. Its success, I understand, has been considerable. Therefore, it would certainly seem that any management with sufficient foresight to set up an "Idea-Buying" Program would be quickly and generously rewarded.

It is suggested that a trial of this plan of an "Idea-Buyer" should be given early and serious consideration by those leaders who realize their responsibility for their company's and the country's continued progress and welfare.

J. H. WILES,
Test Engineer
Pangborn Corp.
Hagerstown, Maryland

As you know, I am a regular reader of your editorial page. In fact, I examine it first, when I get your good magazine.

I agree with your editorial in the June 2 issue, that new ideas are hard to sell. I do wish to remind you that Beechcraft is an organization that is interested in new ideas, and is constantly promoting some of its own.

You mentioned the Pardel airplane. We worked with these people for quite a while and built some wind tunnel models and ran extensive wind tunnel tests on the models built to the Pardel specifications. These tests indicated that they did not substantiate the predicted performance hoped for by the backers of the configuration.

Beechcraft also is a contributor to Jerry Lederer's Flight Safety Foundation, and in addition, carries on a safety campaign of its own. This Beechcraft safety campaign goes back into 1939, with an interruption, of course, for the war years. You are a busy man, and have too many things to read, but anyway I am enclosing a group of safety bulletins that were published recently. We have a new one cooking at this time which will be issued shortly.

Keep up the good work in connection with the fight for better conditions in the government departments, more advances in aviation in all technical matters, and a more open attitude of mind on the part of all engaged in the business.

JOHN P. GATY,
Vice Pres. General Manager
Beech Aircraft Corp.
Wichita 1, Kansas

From LAS

I am writing to thank you for the splendid article by George Christian about the Service Corp., which appeared in AVIATION WEEK. Such stories are so helpful to the morale of our employes and, of course, very helpful to us with the trade. This was particularly well done and carries the admiration of everyone in this company.

J. KENNETH HULL, President
Lockheed Aircraft Service, Inc.
Burbank, Calif.

It wouldn't be proper if I let another week go by without sending along word that George Christian's article on Lockheed Aircraft Service was a fine job and was read several times by all of us here at Idlewild.

George's reports in AVIATION WEEK are read consistently by our people and constitute a backlog of trade information that comes in very handy in our day-to-day operation.

P. M. WILLCOX, Vice President
Lockheed Aircraft Service-International, Inc.
New York International Airport
Jamaica 20, N. Y.

Scorpion's Tail

In your Apr. 14 issue, a reader doubts that the Northrop Scorpion F-89 (as shown in a Minneapolis-Honeywell ad, front cover of the Jan. 14 issue) can be flown without a tail. The airplane does appear to be tailless in the illustration but, of course, as Mr. Rice well knows, the F-89's upswept appendage is hidden behind the right wing.

As a matter of fact, we think that with minor changes the F-89 Scorpion could be flown without a tail. The jaw-like brakes or "decelerons" at the outer end of the wing trailing edge might be used as rudders. Connect a Honeywell Dynamic Stabilizing System to these rudders and you'd be adding, electronically, the stabilizing features of a physical tail.

However, despite the photo, we are not recommending that the tail be lopped off the Scorpion. From what we've seen, it's in excellent airplane the way it is.

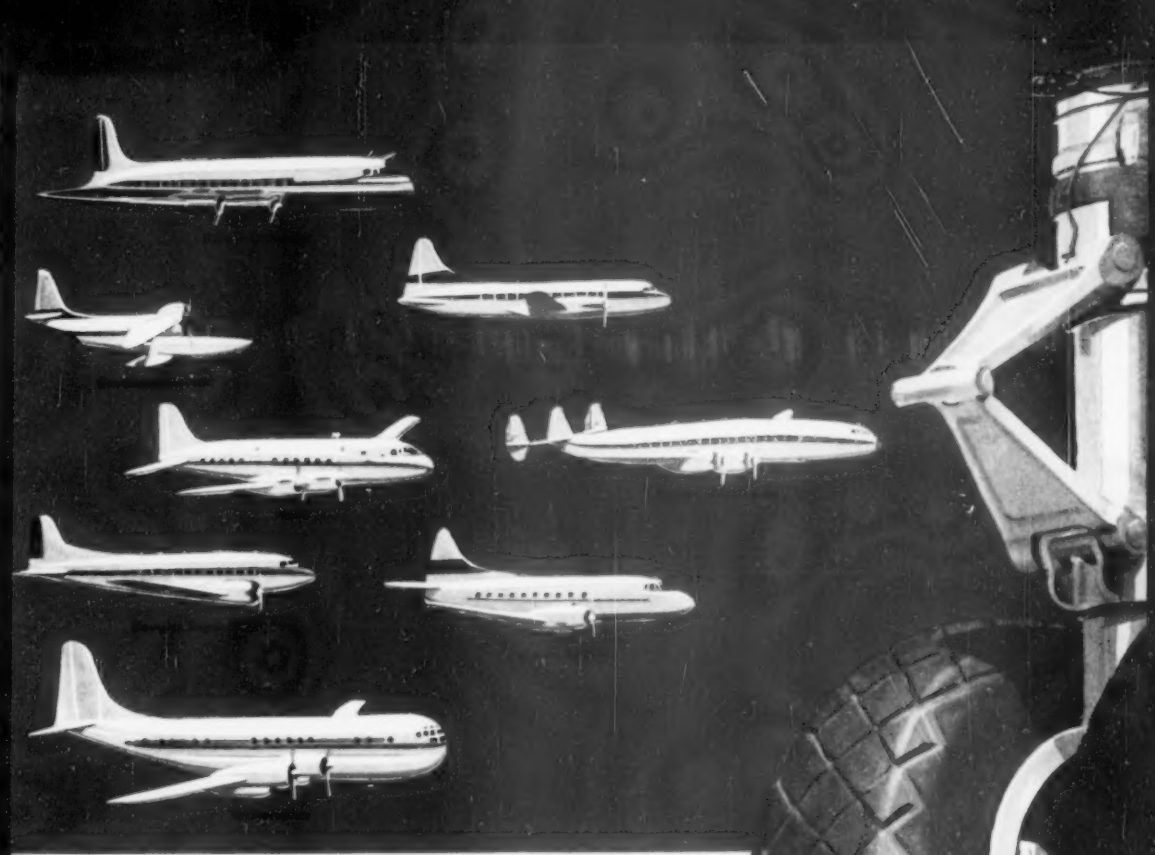
MERRILL JONES, Editor
Minneapolis-Honeywell Regulator Co.
2600 Ridgeway Road
Minneapolis 13, Minn.

The Radar Series

We have read your recent Avionics articles (by Philip Klass) in AVIATION WEEK and feel that the series on air transport radar is particularly well written and timely. We hope that you will continue to include articles of that nature.

R. J. GLEASON
Vice President
Aeronautical Radio, Inc.
1523 L Street, Northwest
Washington 5, D. C.

(Editor Robert H. Wood, whose editorials usually appear on this page, is on vacation.)



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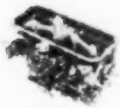

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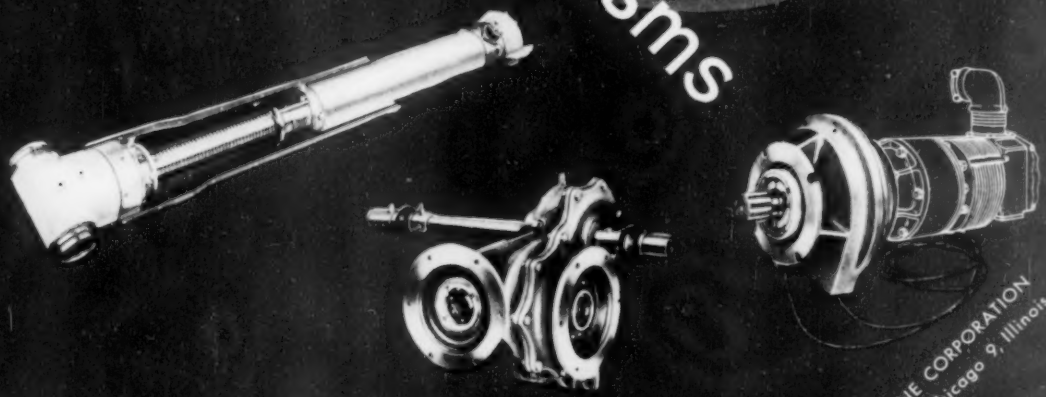

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